(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 October 2003 (23.10.2003)

PCT

(10) International Publication Number
WO 03/088584 A1

(51) International Patent Classification[7]: H04L 12/28, G06F 17/60, A63B 71/06

(21) International Application Number: PCT/SE03/00516

(22) International Filing Date: 31 March 2003 (31.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0201056-9 5 April 2002 (05.04.2002) SE

(71) Applicant and
(72) Inventor: ISAKSSON, Lennart [SE/SE]; Häggvägen 16, S-954 41 Södra Sunderbyn (SE).

(74) Agents: GROTH & CO. KB et al.; Box 6107, Västmannagatan 43, S-102 32 Stockholm (SE).

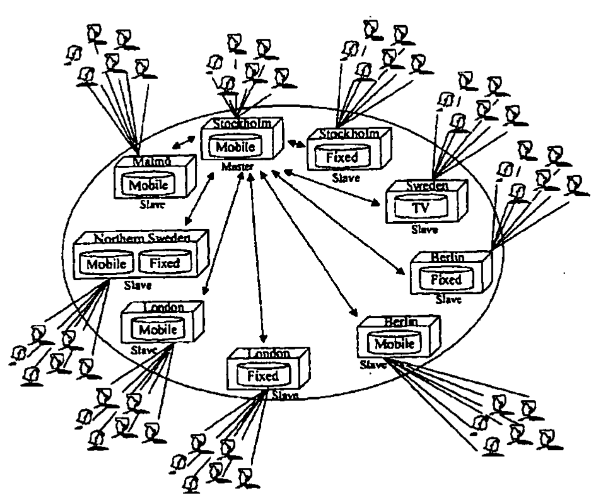
(81) Designated States *(national)*: AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A SYSTEM OPERABLE TO MANAGE AND PROVIDE RESULTS-, PROGNOSIS- AND GAMES & GAMING INFORMATION FOR GEOGRAPHICALLY DISTRIBUTED SPORTS



(57) Abstract: The present invention relates to a system operable to manage and provide results, prognosis and games & gaming information in real time for geographically distributed sport events. The system comprises a number of wireless communica-tion devices, each of which is identified with a unique identification code and at least one located at each geographically distributed event, for transmitting re-sults/information to at least one control means, which is connected to a first mem-ory system for storing said results/information. The system also comprises a to said at least one control means and to said memory system connected computing means operable to, based on said results/information, calculate a prognosis with the aid of an iterative and adaptive algorithm. The system also comprises a to said computing means connected second memory system for storing said prognosis, wherein said second memory means is connected to said at least one control means which in turn transmit said results/information and/or prognosis and/or re-quest for tips to users of said system via mobile or fixed networks.

WO 03/088584 A1

A SYSTEM OPERABLE TO MANAGE AND PROVIDE RESULTS-, PROGNOSIS- AND GAMES & GAMING INFORMATION FOR GEOGRAPHICALLY DISTRIBUTED SPORTS

Technical field of the invention

The present invention relates in a first aspect to a system operable to manage and provide results-, prognosis and games & gaming information.

In a second aspect the present invention relates to a method for managing and providing results-, prognosis and games & gaming information.

In a third aspect the present invention relates to at least one computer program product for managing and providing results-, prognosis and games & gaming information.

Description of related art

Because of physical limitations, competitors as well as audience has limited information regarding the athlete's progress/sub-results during competitions in geographically distributed sport events. This limitation makes the sports less intense- and interesting for the audience than arena sports like for example football, soccer and ice hockey.

In sports like golf, marathon, long-distance running, cross country skiing, sailing, bicycle, orienteering, rally, enduro etc., many of the spectators are dispersed in geography and unable to access the result service presented for the spectators at the start/finish area.

In many of these sports, the athletes are starting the competition at different time intervals, which still makes it hard for ordinary interested spectators to follow/appreciate the competition.

In many of the geographical distributed sports, the results are measured by used time. The systems used today for collection- and presentation of time results are expensive and cumbersome to use. They are therefore used only at major national- and international events. For all smaller regional- and local events, the spectators- and the athlete's isn't provided with part-time result services.

The spectators at the start/finish area are today provided by result service through speaker- and manual- or electrical result boards. The spectators at other places are not provided with any result service at all.

The spectators off-site are for major national events provided with result service through radio- or television, which in some cases could be an alternative also for the on-site spectators. This information is however distributed in broadcast mode which many times don't match the information requirement from spectators at different locations.

In some rare cases, information from athletic events have been made available on the web. Large problems with existing solutions are that they don't support:

- Secure data collection- and presentation making sure "hackers" won't publish manipulated results which would cause major problems especially related to games- and gaming.
- Economical-, fast- and accurate collection of part-time results through non-circuit switched networks utilizing sensors with internal clock's that isn't synchronized with each other.
- Real-time collection of golf scores hole-by-hole directly from athletes / markers.
- Prognosis calculation and presentation that makes the competition more exciting for athletes and spectators.

There exist some "off-line" electronic scorecard applications for storing golf-scores locally on the player/markers palm computer. The applications support "beaming" scores between two players palm computers through IR-interface. It is also possible to "beam" golf score to the organizers PC when the players get to the Club House (beaming with IR has limited coverage of about 1-20 centimetres). These applications doesn't support:

- System architecture that makes it possible for players to use different brands of mobile phones and palm computers.
- System structure that supports mobile terminals connected through heterogeneous mobile networks (GSM, GPRS, 3G, radio-LAN or similar mobile communication technologies).
- Application that includes Leader Board functionality (Leader Board present for each golf player the golf score on each individual golf hole. For each golf hole, the par-result is also presented. If a player has achieved results better or worse than par, specific symbols (rings- and squares) is placed around the players result) where the result presentation is continuously sorted based on prognosis for the outcome of the competition.
- System architecture that makes it possible to update leader-board continuously in real time instead of sync-mode.
    - Management functionality for setting-up golfers/markers that are allowed to collect/transfer score results to be displayed on the electronic leader-board, secure verification that the golfer/marker is transferring data from an approved device including secure log-in to the system. Very important parts, since the introduction of mobile on-line electronic score cards will impact the game-strategy for the players. Faked/manipulated results are likely to impact the outcome of the competition, which cannot be accepted. Detec-

tion is therefore made to identify if a marker has reported different sub-result/results during the competition than what is finally submitted/reported to the event organizer after the completion of the competition. If a difference is identified, the event organizer can decide to give the marker penalty strokes.

- Scalable system architecture and data base structure that makes it possible to manage interactive games- and gaming applications with high requirements on short time for result distribution- and collection of tips for large number of gamblers connected through different terminal types and heterogeneous network technologies.

Summary

It is an object of the present invention to solve the above-mentioned problems.

According to the present invention there is provided in a first aspect a system operable to manage and provide results-, prognosis and games & gaming information in real time for geographically distributed sport events. The system comprises a number of wireless communication devices, each of which is identified with a unique identification code and at least one located at each geographically distributed event, for transmitting results/information to at least one control means which is connected to a first memory system for storing said results/information. The system also comprises a to said at least one control means and to said first memory means connected computing means operable to, based on said results/information, calculate a prognosis of an outcome of said events with the aid of an iterative and adaptive algorithm. The system also comprises a to said computing means connected second memory system for storing said prognosis, wherein said second memory system is connected to said at least one control means, which in turn transmits said results/information and/or prognosis to users of said system via a mobile or fixed network. This system makes it possible to geographically dispersed spectators to receive full access information regarding progress/sub-results during competitions in geographically distributed events. The system also makes it possible for geographically dispersed spectators to receive prognosis regarding geographically distributed events and attend interactive games & gaming applications.

A further advantage in this context is achieved if each memory system comprises a number of geographically distributed databases.

Furthermore, it is an advantage in this context if said system also comprises different types of geographically distributed sensors operable to collect different types of information from said geographically distributed events.

A further advantage in this context is achieved if one type of sensor is a time measuring sensor, and in that an internal clock of an individual sensor is calibrated through a circuit switched synchronization pulse.

Furthermore, it is an advantage in this context if one type of sensor can be a biometric sensor.

A further advantage in this context is achieved if said identification code is based on A-number and/or IP-address and/or individual device identification code.

Furthermore, it is an advantage in this context if said A-number and/or IP-address and/or individual device identification code is combined with user and password identification.

A further advantage in this context is achieved if said A-number and/or IP-address and/or individual device identification code is combined with user and password identification or electronic certificate.

Furthermore, it is an advantage in this context if said distributed events are sport events where the performance is measured by used time, and in that said iterative and adaptive algorithm for calculating a prognosis can be expressed as:

$$\mathrm{P\,(Athlete, L{+}1) = Time\,(Athlete, L) + ATime\,(L{+}1) * \sum_{X=1}^{L} \{k\,(L, X) * \ Time\,(Athlete, X)/ATime(X)\}},$$

wherein N is the number of time controls in the competition; L is the number of the last time control the athlete in question has passed; k (L, S) is an adjustable matrix of variables for each time control prognosis calculation; P (Athlete, M) is the prognosis for the athlete in question at time control M, wherein M is an integer and L + 1 ≤ M ≤ N; Time(Athlete, L) is measured time between the last time control (L) the athlete in question has passed and the preceding one, and ATime (M) is the average time between time control M and the preceding time control for athletes who has passed time control M.

A further advantage in this context is achieved if the initial values of the matrix k (L, X) us calculated using the following algorithm:

$$k\,(L, X) = X \Big/ \left\{ \sum_{y=1}^{L} y \right\},$$

wherein L is the number of the time control last passed by the athlete for which the prognosis is calculated, X is the number of time controls for which the tendency is

calculated between the athlete in question and all other athletes that has passed the time control for which the prognosis is calculated (L + 1).

Furthermore, it is an advantage in this context if said recursive algorithm for calculating a prognosis is complemented with individual weighting factors for each athlete, wherein said weighting factors are based on the athletes individual performance characteristics during similar races.

A further advantage in this context is achieved if said computing means calibrates said k (L, X) matrix and said weighting factors after a competition/race is finished.

Furthermore, it is an advantage in this context if said distributed events is a golf tournament, and in that said recursive algorithm for calculating a prognosis can be expressed as:

$$P\,(\text{Player}, L+1) = \text{AScore}\,(L+1) * \left\{ \sum_{X=1}^{L} k\,(L, X) * \text{Score}\,(\text{Player}, X)/\text{AScore}\,(X) \right\},$$

wherein N is the number of holes in a competition; L is the last hole reported for the player in question; k (L, X) is an adjustable matrix of variables for each golf hole prognosis calculation, and AScore (Player, L) is last reported golf score for the player in question for hole L.

A further advantage in this context is achieved if said computing means calibrates said k (L, X) matrix after the competition is finished.

Another object of the invention is to provide a method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events with the aid of a system comprising a number of wireless communication devices, at least one of which is located at each geographically distributed event. The method comprises the steps of:

- with the aid of said wireless communication devices, to transmit results/information to at least one control means;
- to store said results/information in a first memory system connected to said at least one control means;
- to, based on said results/information, calculate a prognosis of an outcome of said events with the aid of an iterative and adaptive algorithm;
- to store said prognosis in a second memory system connected to said at least one control means; and
- to transmit said results/information and/or prognosis to users of said system via a mobile or fixed network. This method makes it possible to geographically dispersed spectators to receive full access information regarding progress/sub-

results during competitions in geographically distributed events. The method also makes it possible for geographically dispersed spectators to receive prognosis regarding geographically distributed events and attend interactive games & gaming applications.

A further advantage in this context is achieved if each memory system comprises a number of geographically distributed databases, wherein said storing steps consists of:

- to store said results/information in said first databases; and
- to store said prognosis in said second databases.

Furthermore, it is an advantage in this context if said system also comprises different types of geographically distributed sensors, wherein the method also comprises the steps:

- said sensors collects different types of information from said geographically distributed events; and
- to send said collected information to said at least one control means.

A further advantage in this context is achieved if one type of sensor is a time measuring sensor, and in that said method also comprises the step:

- to calibrate an internal clock of an individual time measuring sensor through a circuit switched synchronization pulse.

Furthermore, it is an advantage in this context if one type of sensor is a biometric sensor.

A further advantage in this context is achieved if each wireless communication device is identified with a unique identification code based on A-number and/or IP-address and/or individual device identification code.

Furthermore, it is an advantage in this context if said A-number and/or IP-address and/or individual device identification code is combined with user id and password identification and/or electronic certificate.

A further advantage in this context is achieved if said distributed events are sport events where the performance is measured by used time, and in that said calculation step is performed by:

- calculating said prognosis by using the iterative and adaptive algorithm:

$$P\,(\text{Athlete},L+1)=\sum_{X=1}^{L}\text{Time}\,(\text{Athlete},X)+\text{ATime}\,(L+1)*\sum_{X=1}^{L}\{k\,(L,X)*\ \text{Time}\,(\text{Athlete},X)/\text{ATime}(X)\}$$

wherein N is the number of time controls in the competition; L is the number of the last time control the athlete in question has passed; k (L, S) is an adjustable matrix of variables for each time control prognosis calculation; P (Athlete, M) is the prog-

nosis for the athlete in question at time control M, wherein M is an integer and $L + 1 \leq M \leq N$; Time(Athlete, L) is measured time between the last time control (L) the athlete in question has passed and the preceding one, and ATime (M) is the average time between time control M and the preceding time control for athletes who has passed time control M.

Furthermore, it is an advantage in this context if said method also comprises the step:

- to calculate the initial values of the matrix k (L, X) according to the following algorithm:

$$k\,(L, X) = X \Big/ \left\{ \sum_{Y=1}^{L} Y \right\},$$

wherein L is the number of the time control last passed by the athlete for which the prognosis is calculated, X is the number of time controls for which the tendency is calculated between the athlete in question and all other athletes that has passed the time control for which the prognosis is calculated (L + 1).

A further advantage in this context is achieved ifsaid recursive algorithm for calculating a prognosis is complemented with individual weighting factors for each athlete, wherein said weighting factors are based on the athletes individual performance characteristics during similar races.

Furthermore, it is an advantage in this context if said method also comprises the step:

- with the aid of said computing means, to calibrate said k (L, X) matrix and said weighting factors after a competition/race is finished.

A further advantage in this context is achieved if said distributed events are a golf tournament an in that said calculation step is performed by:

- calculating said prognosis by using the iterative and adaptive algorithm:

$$P\,(\text{Player}, L{+}1) = \text{AScore}\,(L{+}1) * \sum_{x=1}^{L} \{k\,(L, X) * \text{Score}\,(\text{Player}, X) / \text{AScore}(X)\}$$

wherein N is the number of holes in a competition; L is the last hole reported for the player in question; k (L, X) is an adjustable matrix of variables for each golf hole prognosis calculation; and AScore (Player, L) is last reported golf score for the player in question for hole L.

Furthermore, it is an advantage in this context if said method also comprises the step:

- with the aid of said computing means, to calibrate said k (L, X) matrix after the competition is finished.

Another object of the invention is to provide at least one computer program product directly loadable into the internal memory of at least one digital computer. The at least one computer program product comprises software code portion for performing the steps of the method according to the present invention, when said at least one product is/are run on said at least one computer. The computer program product(s) makes it possible for geographically dispersed spectators to receive full access information regarding progress/sub-results during competitions in geographically distributed events. The product(s) also makes it possible for geographically dispersed spectators to receive prognosis regarding geographically distributed events and attend interactive games & gaming applications.

It should be emphasised that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, steps or components but does not preclude the presence of one or more other features, integers, steps components of groups thereof.

Embodiments of the invention will now be described with a reference to the accompanying drawings, in which:

Brief description of the drawings

Figure 1	shows a block diagram of a system that manages and provides results-, prognosis and games & gaming information in real time according to the present invention;
Figure 2	is a flow chart of a method for providing results/information and prognosis according to the present invention;
Figure 3	shows a schematic diagram of some computer program products according to the present invention;
Figure 4	shows a schematic diagram of distributed servers, databases and modem pools for different regions and network connection types according to the present invention;
Figure 5	Shows the optimised database storage structure according to the present invention;
Figure 6	shows a table illustrating the prognosis calculation according to the present invention
Figure 7	shows a schematic diagram of a track with a number of time controls;
Figure 8	is a flow chart of calibration of time measurement data from distributed sensors calculation according to the present invention;

Figure 9	is a flow chart of correction of collected time results before presentation according to the present invention;
Figure 10	is a flow chart of approval procedure for markers according to the present invention;
Figure 11	is a flow chart of transmission of golf score results from approved markers according to the present invention;
Figure 12	is a flow chart of Leader Board presentation to approved users according to the present invention;
Figure 13	is a flow chart of payment set-up for users that would like to play games- and gaming applications based on the result information according to the present invention;
Figure 14	is a flow chart of collection of golf results for determination which players has made correct tips and gets invited to continue the game according to the present invention;
Figure 15	is a flow chart that request new tip from gamblers qualified to continue the interactive games- and gaming application according to the present invention; and
Figure 16	is a flow chart that creates tip for qualified gamblers who have not submitted new tip on time according to the present invention.

Detailed description of embodiments

Figure 1 shows a block diagram of a system operable to provide results/information and prognosis from geographically distributed events according to the present invention. The system 10 comprises a number of wireless communication devices $12_1, \ldots, 12_n$, each of which is identified with a unique identification code and at least one located at each geographically distributed event. In figure 1 there is disclosed n different wireless communication devices $12_1, \ldots, 12_n$, each of which transmits results/information to at least one control means 14 which is connected to a first memory system 16 for storing said results/information. For the sake of simplicity, there is only disclosed one control means 14 in figure 1. The system 10 also comprises a to said control means 14 and to said first memory system 16 connected computing means 18 operable to calculate a prognosis of an outcome of said events with the aid of a recursive algorithm. The calculation is based on said results/information. The system 10 also comprises a to said computing means 18 connected second memory system 20 for storing said prognosis. The second memory system 20 is also connected to the control means 14. The control means 14 transmits said results/information and/or prognosis to users of the system 10 via a mobile or fixed network. The users are diagrammatically dis-

closed in figure 1 with a number (m) of wireless communication devices $22_1, \ldots, 22_m$. It should also be noted that some users both transmit sub-results and receive presentation on their wireless communication devices $22_1, \ldots, 22_m$ of results/ prognosis. The mobile or fixed network is not disclosed in figure 1.

In a preferred embodiment of the system 10 according to the present invention, each memory system 16, 20 comprise a number of geographically distributed databases. (See figure 4 and 5.)

In a preferred embodiment of the system 10 according to the present invention the system 10 also comprises different types of geographically distributed sensors (not disclosed) operable to collect different types of information from said geographically distributed events. Said sensors can be connected to or integrated with said wireless communication devices $12_1, \ldots, 12_n$.

In a preferred embodiment of the system 10 is one type of sensor a time measuring sensor, and an internal clock of an individual sensor is calibrated through a circuit switched synchronization pulse.

In yet another embodiment of the system 10 can one type of sensor be a biometric sensor.

In yet another embodiment of the system 10 is the identification code based on A number and/or IP address and/or individual device identification code.

In yet another embodiment of the system 10 is the identification code based on A number and/or IP address and/or individual device identification code and/or electronic certificate.

In yet another embodiment of the system 10, the A number and/or IP address and/or individual device identification code and/or electronic certificate combined with user and password identification.

In figure 6 there is disclosed a table illustrating the prognosis calculation according to the present invention.

Prognosis calculation for one time control ahead

For Athlete B, the prognosis algorithm calculates how each of the part times for athlete B correlates with the athletes who have passed the goal (in this case only athlete A).

The prognosis calculation compares the progress between every pair of time controls for the actual athlete (B in this example) and the athlete/athletes that have passed the time control for which the prognosis is calculated (time control 6 – the Goal which only athlete A has passed in this example). Each of the comparison results is multiplied with a weight factor k(,). The comparison results represents the actual tendency between actual athlete (B in this example) and the ath-

lete/athletes passed next time control (A in this example) for every pair of time controls passed so far. By multiplying the "tendency" sum with the mean time between the next- and previous passed time controls (time control 6 and 5 in this example) for the athletes who has passed the next time control (only athlete A in this example) generates the prognosis time for actual athlete (B in this example) between the time control for which the prognosis is calculated (time control 6 in this example) and the preceding time control (time control 5 in this example). By adding the used time for actual athlete (athlete B in this example) from start to time control 5 with the prognosis time for actual athlete between time control 5 and 6, the absolute prognosis time reaching time control 6 for actual athlete B is generated.

The correlation is calculated for each pair of part time controls both A and B in this example has passed. By using weight factors for all time controls, the algorithm makes it possible to give higher priority to the correlation between the athletes at the later part of the race. By using this information, the algorithm estimate the time for athlete B from time control 5 to the goal by a calculation assuming the tendency between the athletes progress will remain during the last part of the race.

Prognosis calculation for two- or more time controls ahead

For Athlete C, the correlation calculation is made with all athletes passing time control 5 (in this case Athlete A and B). When the prognosis for time control 5 has been calculated, that time is used as "real time" for Athlete C at time control 5 when the prognosis algorithm is applied again for athlete C calculating the prognosis for time control 6 - the goal. For the prognosis of the finish time, the correlation is only calculated for athletes who have passed the goal (only athlete A in this example).

Calibration of the prognosis algorithm (adaptive prognosis algorithm)

When Athlete C has passed time control 5, the prognosis algorithm is restructured calculating the optimal value of the "constant" weight factors that would have generated a correct prognosis for athlete C at time control 5. The real time at time control 5 as well as the optimum value of the constant weight factor is then used when an up-dated prognosis for the finish time at the goal is calculated for C.

Precision of the prognosis calculations

The same procedure is repeated for all athletes that have passed at least one time control. The precision of the algorithm is highest predicting the next time control for athletes when as many athletes as possible has passed the next time control. But because of the

adaptive learning of the algorithm through earlier similar competitions, the quality gets high also for predictions several time controls ahead.

Prognosis time for the athletes that are the first ones passing time controls

For the athletes in a competition that are the first passing a time control, it is not possible to use the advanced prognosis algorithm. It could even though be interesting for the audience to get a rough estimate of the time when these athletes will pass the coming time controls including the time passing the goal for the athletes during the competition. The algorithm for this calculation is:

<u>Parameters & Definitions</u>

Next Time Control	The time control for which a prognosis shall be calculated. This could be any time control between the last time control passed by actual athlete to the time control at the goal of the competition.
Speed(Athlete)	Average speed (meter/second) of the athlete from start to the last time control the actual athlete has passed
Start_Time(Athlete)	Absolute time (hour, minutes and seconds) when actual athlete started the race.
Time(Athlete)	Time (seconds) the actual athlete has used from start to the last time control the actual athlete has passed.
Distance(Athlete, Last Time Control)	Distance (meter) from start to the last time control actual athlete has passed.
Distance(Athlete, Next Time Control)	Distance between last time control passed for actual athlete and the next time control
Delta_Time(Athlete, Next Time Control)	Prognosis time (seconds) for actual athlete to move from last time control passed to the next time control.
PTime(Athlete, Next Time Control)	Prognosis time (absolute time, hour , minutes and seconds) when actual athlete will pass next time control

Speed(Athlete) = Distance(Athlete, Last Time Control) / Time(Athlete)

Delta_Time(Athlete, Next Time Control) = Distance(Athlete, Next Time Control) / Speed(Athlete)

PTime(Athlete, Next Time Control) = Start_Time(Athlete) + Time(Athlete) + Delta_Time(Athlete, Next Time Control)

If the competition is made through several rounds on the same track, the algorithm is enhanced after 1st round to:

ADelta_Time(Athlete, Next Time Control) Average time for actual athlete at previous round/rounds from last time control passed to next time control.

PTime(Athlete, Next Time Control) = Start_Time(Athlete) + Time(Athlete) + ADelta_Time(Athlete, Next Time Control)

The algorithms can also be used in countries not using the metric system. In those cases, meter is exchanged with yard.

Basic pre-conditions

Used time is collected at N positions at the track where the competition takes place. The last of these is the goal/end-point for the competition. In order to make a prognosis, N has to be larger than 1. As soon as an athlete has passed a time control, the result is transferred to the prognosis algorithm for calculation of actual prognosis for the next- and all other remaining time controls.

<u>Parameters & Definitions</u>

Actual athlete	The athlete the prognosis is made for.
N	Number of time controls in the competition. Last time control is at the finish line.
L	Last time control actual athlete has passed, L< N (if L = N, there is no need to calculate a prognosis for the actual athlete since the athlete has passed the goal / finish line.
k(L, X)	Adjustable matrix of weight factors for each time control prognosis calculation. The first variable in the matrix (represented by variable L in this example) represents the time control number of the last time control actual athlete has passed. The 2nd vari-

able in the matrix (represented by variable X in this example) represents the value for each time control starting with the 1st one and ending with the last one passed by actual athlete. The reason for making k(,) two dimensional is the following: Calculating a prognosis after actual athlete has passed the first control with sub-result makes it possible to compare actual athlete's results with the athlete's who has passed next sub-result control only at the first sub control. When actual athlete has passed two controls, it is possible to make the comparison at two controls etc. In order to utilize the same number of factors for k(), as the number of sub-result controls actual athlete has passed it is necessary to utilize the first variable in the matrix. When a prognosis is calculated for a specific sub-result control, it is necessary that the sum of the k(,) values for the number of sub-controls passed so far by actual athlete (2nd variable in the matrix) = 1.

Example of k(L,X) matrix:

$$K(L,M) = \begin{pmatrix} 1 & & & & \\ 1/3 & 2/3 & & & \\ 1/6 & 2/6 & 3/6 & & \\ 1/10 & 2/10 & 3/10 & 4/10 & \\ 1/15 & 2/15 & 3/15 & 4/15 & 5/15 \end{pmatrix}$$

Where L=rows, M=columns for a competition with 6 time controls. When a prognosis for 2nd time control is made, value of first row and first column in the matrix is used. When prognosis for 3rd sub control is made, 2nd row in the matrix is used for which the value of 1st column is used for the comparison between the athletes at 1st sub control and the value of 2nd column for the comparison at 2nd sub control. When a prognosis is made for the end of the competition (sub control 6), the last row in the matrix is used for which value in 1st column is used for comparison between athletes performance at 1st sub control, value of 2nd column for comparison at 2nd sub control etc. until

value in last column is used for comparison between the athletes at the 5^{th} sub control. As explained later, the sum of the values at each of the rows in the matrix shall always be exactly = 1. It is however possible to change the "weight factors" in each row in order to "fine tune" the prognosis algorithm creating as high precision as possible.

P(Athlete, M) Prognosis for actual athlete at time control M, M is a value in the interval between L+1 to N.

Time(Athlete, 1) measured time from start to 1^{st} time control for the actual athlete

Time(Athlete, 2) measured time between 1^{st} and 2^{nd} time control for actual athlete

.

.

.

Time (Athlete, L) measured time between the last time control (=L) the actual athlete has passed and the preceding one.

ATime(1) average time from start to 1^{st} time control for athletes who has passed time control M (M is the time control for which the prognosis is calculated)

ATime(2) average time between 1^{st} and 2^{nd} time control for athletes who has passed time control M

.

.

.

ATime(M) average time between time control M and the preceding time control for athletes who has passed time control M.

General prognosis algorithm

$$P(\text{Athlete},L+1) = \left[\sum_{X=1}^{L}\text{Time}(\text{Athlete},X)\right]+\text{ATime}(L+1) * \sum_{X=1}^{L}\{k(L,X) * \text{Time}(\text{Athlete},X) / \text{ATime}(X)\}$$

The algorithm is iterative and adaptive. That mean that if a prognosis shall be calculated for an athlete two-time control's ahead, step one is to calculate the prognosis for the next time control. When the prognosis is calculated for two time controls ahead, the prognosis value for the next time control is used as the actual time for the actual athlete reaching that time

control. The ATime is always calculated for the Athletes that has passed the time control for which the prognosis is calculated. The same procedure is repeated until the prognosis is calculated for the last time control. As always, when the actual Athlete has reached the next time control, all prognosis calculation for the remaining time controls are re-calculated based on the real time results so far instead of prognosis values.

Selection of athletes to consider for the prognosis calculations

Since the performance level can be very different between athletes in the same competition, a recommendation is that the prognosis algorithm considers only a sub-set of athletes with similar performance level at last time control passed by actual athlete, for example the five athletes with most similar time. When the prognosis algorithm is applied iterative for next time control, a new sub-set is selected with for example the five athletes with most similar time at that time control compared with the prognoses time for actual athlete. The same procedure is then repeated until the prognosis for the final time control is calculated for actual athlete.

Calculation of the values of k(L, X)

In the formula above, the initial values of the k(L, X) matrix is calculated using the following algorithm:

$$k(L, X) = X \Big/ \left\{ \sum_{Y=1}^{L} Y \right\},$$

where L is the number of the time control last passed by the athlete for which the prognosis is calculated. X is the number of the time controls for which the tendency is calculated between actual athlete and all other athletes that has passed the time control for which the prognosis is calculated (L+1). During the prognosis calculation, X is stepped from 1 to L.

Enhancement of the algorithm based on individual athletes individual performance characteristics during a race (optional)

Some athletes have higher ability than others to "speed-up" during the finish part of the races. Other athletes are "always" starting-up races at a higher relative speed than the others, and some are holding a very constant speed through the whole race.

In order to consider these specific characteristics, an optional extension is made to the prognosis algorithm generating even higher precision in the prognoses.

The measurements and calculations are done through the following procedure:

Calculation of an athlete's relative speed at first third of similar relevant races

Calculate the quotient between the actual athletes average time from start to time controls at about 1/3rd of the earlier races with the same athletes total time from start to goal at the same races.

<u>Definitions</u>

Start_Up(Athlete)	Quotient between the actual athlete average time from start to a time control at about 1/3rd of the race with the same athlete total time from start to goal at the same races.
Prev_Part_Time(c, t, Athlete)	Matrix storing results from previous competitions. First variable (represented with c) represent the index for each of the stored competitions. Second variable (represented by t) represent the time control index for each of the stored competitions. The last variable (represented by Athlete) represents the index for respective athlete in the matrix. The stored value of Prev_Part_Time is the used time for actual athlete for indexed segment in indexed competition.
Prev_Total_Time(c, Athlete)	Matrix storing results from previous competitions. First variable (represented with c) represent the index for each of the stored competitions. The last variable (represented by Athlete) identify the total time actual athlete has used during the specific competition

<u>Algorithm</u>

$$\text{Start\_Up(Athlete)} = (1/\text{c\_max}) * \sum_{c=1}^{\text{c\_max}} \{\text{Prev\_Part\_Time(c,t,Athlete)}/\text{Prev\_Total\_Time(c,Athlete)}\},$$

For which:

c_max is the total number of relevant competitions for which the calculation is done. If only selected competitions

shall be considered, only the index-numbers for these specific competitions is used as index for variable c in the sum.

t
In this example, we presume that t = 3 for all stored competitions.
If t > than 3, then it is either possible to create more segments for this "Individual performance factor) or select a time comntrol that is at about one third after the race and accumulate used time until that time control is passed as "Prev_Part_Time".

Calculate the quotient between the athletes that has passed the time control in this actual race for which the prognosis is calculated (since these are the only athletes considered in the prognosis calculation) average time from start to a time control at about 1/3rd of the previous races considered for actual athlete above with the same athletes total time from start to goal at the same races.

<u>Definitions</u>

AStart_Up(Athlete)
Quotient between the athletes, who has passed the time control for which the prognosis is calculated for average time from start to a time control at about 1/3rd of the earlier races considered for actual athlete above with the same athletes total time from start to goal at the same earlier races.

<u>Algorithm</u>

$$\text{Start\_Up(Athletes)} = (1/(\text{c\_max} * \text{Nr\_of\_Athletes})) * \sum_{\text{C}=1,\ \text{Athlete} = \text{Athlete\_V}}^{\text{c\_max},\ \text{Athlete\_W}} \{\text{Prev\_Part\_Time(c,t,Athlete)} / \text{Prev\_Total\_Time(c, Athlete)}\}$$

For which:

Athlete_V to Athlete_W
The set of athletes which has passed the time control for which the prognosis is made. This is the only athletes considered during this calculation.

Nr_of_Ahtletes
Number of athletes in the relevant set of athletes Athlete_V to Athete_W.

When Start_Up(Athlete) and ASTart_Up(Athletes) has been calculated, it is possible to calculate the Start_Up_Factor(Athlete). This is the relative value of the actual athletes performance during earlier competitions:

Start_Up_Factor(Athlete) = Start_Up(Athlete) / AStart_Up(Athletes)

Athletes that have started-up races at average speed get Start_Up_Factor(Athlete)=1. Athletes who have started-up races faster than average gets Start_Up-Factor < 1. Athletes who have started-up races slower than average gets Start_Up_Factor > 1.

<u>Calculation of an athletes relative speed from time controls at about one third of similar relevant races to time controls at about two third at the same races</u>

Identical structure of the calculation as for Start_Up_Factor with the exception that the calculation is made for the time comparison between time controls at about one third- to two third of previous races with total time in the same races. The final calculation becomes then:

Mid_Factor(Athlete) = Mid(Athlete) / AMid(Athletes)

<u>Calculation of an athletes relative speed from time controls at about two third of similar relevant races to the goal at the same races</u>

Identical structure of the calculation as for Start_Up_Factor with the exception that the calculation is made for the time comparison between time controls at about one two third of previous races with total time in the same races. The final calculation becomes then:

Finish_Factor(Athlete) = Finish(Athlete) / AFinish(Athletes)

Usage of the individual relative speed factors when prognosis's is calculated

<u>Prognosis calculation for time controls during the first third of the race</u>

Example:

Start_Up factor(Athlete) = 1.1

Mid_Factor(Athlete) = 1.0

Finish_Factor(Athlete) = 0.9

When prognosis for time controls during the first third of a race is computed, the result is calculated as follows:

Adjusted_P(Athlete, M) = [A1 + B1 * {Start_Up_Factor(Athlete) }] * P(Athlete, M),

where :

M The time control for which the prognosis is calculated

A1 Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

B1 Complementary Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

The sum of: A1 + B1 = 1

This makes it possible to fine-tune the impact of the Start_Up_Factor. For example, if A1 = 1 and B1 = 0, the Start_Up_Factor is neglected totally at the prognosis calculation. If instead A1=0 and B1=1, the full effect of the Start_Up_Factor is applied during the prognosis calculation. For all combinations in between, a partial impact of the Start_Up_Factor is applied at the prognosis calculation.

<u>Prognosis calculation for time controls during the mid-part of the race</u>

When a prognosis for time controls between first third of a race and second third of a race is calculated, the result is multiplied with:

Adjusted_P(Athlete, M) = [A2 + B2 * {Mid_Factor(Athlete) }] * P(Athlete, M),

where :

M The time control for which the prognosis is calculated

A2 Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

B2 Complementary Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

The sum of: A2 + B2 = 1

<u>Prognosis calculation for time controls during the last third of the race</u>

When a prognosis for time controls between second third of a race and the goal is made, the result is multiplied with:

Adjusted_P(Athlete, M) = [A3 + B3 * {Finish_Factor(Athlete) }] * P(Athlete, M),

where :

M The time control for which the prognosis is calculated

A3 Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

B3 Complementary Weight factor between 0 and 1 that effect the impact of the Start_Up_Factor in the adjusted prognosis

The sum of: A3 + B3 = 1

Further enhancement of the prognosis algorithm related to athletes individual performance curbs during a race

The algorithms described above divide a race in three major segments (start_up, mid and finish). If there exist time control data from earlier relevant competitions for involved athletes with many time controls, it is recommended that the algorithm above is modified with as many segments as possible.

Calibration of the k(L, X) matrix after finished competition

In order to optimize the precision of the prognosis algorithm, it is made adaptive through calibrations of the k(L, X) values when a competition is ended. The calibration is done as follows:

Initially, the values at each column on same row of the k(L, X) matrix is increased linear with a specific value (the numerator is increased with the value 1) for every cell when X (index the columns) is stepped from 1 to L (see figure below). The reason for this is to give the relative performance change during later phases during the competition higher priority than the relative performance change earlier in the competition.

$$K(L,X) = \begin{pmatrix} 1 & & & & \\ 1/3 & 2/3 & & & \\ 1/6 & 2/6 & 3/6 & & \\ 1/10 & 2/10 & 3/10 & 4/10 & \\ 1/15 & 2/15 & 3/15 & 4/15 & 5/15 \end{pmatrix}$$

After the race is finished, it is recommended to try-out other values for the k(L,X) matrix using other gradient of the curb as well as exponential and 1/exponential curbs.

The calibration algorithm is:

Every row in the matrix represents the weight factors utilized for prognosis calculation at a specific sub-result control at the competition. Row 1 for prognosis calculations for sub-result control 2, row 2 for prognosis calculation for sub-result control 3 etc.

Calibration of row nr 1 in k(L,X) matrix

No calibration since the row contains only one factor and that the sum of the factors always shall be exactly 1 for every row in the matrix.

Calibration of row nr 2 in the K(L, X) matrix

For every new set of value combinations, the absolute difference between the prognosis time when the value-set is applied in the prognosis algorithm and the actual time for every athlete passing time control 3 is accumulated and stored in the vector ERROR(Value_Set), where Value_Set represent the actual value set used for the prognosis calculations (value combination in column 1 and 2 on row 2).

The Value_Set that has created the lowest accumulated absolute error value is selected as the optimum value set in the k(L, X) matrix for the next competition.

If a higher precision is requested for the calibration, the above procedure is repeated over and over again with new value sets each time with more decimals in the interval from just below- and above the value set that has resulted in lowest accumulated error so far.

If optimal value set has been calculated for similar competitions earlier, it is recommended to use the average value of optimized value sets during the next competition.

Calibration of row nr 3 in the K(L, X) matrix

For every new set of value combinations, the absolute difference between the prognosis time when the value-set is applied in the prognosis algorithm and the actual time for every athlete passing time control 4 is accumulated and stored in the vector ERROR(Value_Set), where Value_Set represent the actual value set used for the prognosis calculations (value combination in column 1, 2 and 3 on row 3).

The Value_Set that has created the lowest accumulated absolute error value is selected as the optimum value set in the k(L, X) matrix for next competition.

If a higher precision is requested for the calibration, the above procedure is repeated over and over again with new value sets each time with more decimals in the interval from just below- and above the value set that has resulted in lowest accumulated error so far.

If optimal value set has been calculated for similar competitions earlier, it is recommended to use the average value of optimized value sets during the next competition.

Calibration of row nr 4- in the K(L, X) matrix

The same procedure as described for row 2-3 is repeated for all remaining rows in the K(L,X) matrix. For every new row, one more column is included in the value set.

Calibration of the sets of (A1, B1), (A2, B2) and (A3,B3) variables

At the end of a competition, the prognosis for the time controls are calculated for all relevant athletes (everybody but the ones that passed the next latest time control before anybody has reached the latest time control) using value sets for the A- and B sets ranging between (1.0, 0.0), (0.9, 0.1), (0.8, 0.2), (0.7, 0.3), ..., (0.1, 0.9) and (0.0, 1.0). For every prognosis, a prognos_error is calculated:

Prognos_Error(Athlete, N, A, B) = Time(N) – P(Athlete, N),

Where: N identify actual time control for which the prognosis is made
A represent the value of actual A1, A2 or A3 variable
B represent the value of actual B1, B2 or B3 variable

For every value set of (A, B) with resolution one decimal, the accumulated prognosis error is calculated:

$$\text{Acc\_Prognos\_Error(B)} = \sum_{F=1, A=A1, B=B1}^{N, AJ, BJ} \left| \text{Prognos\_Error(Athlet e,F,A,B)} \right|$$

where

F: Represent the actual time control number, N is the total number of time controls at the specific competition.

A: Represents the actual A-variable used for considering individual performance curb at the race. A range from A1 to AJ where J is the number of segments for which time controls are available at considered competitions

B: Represents the actual B-variable used for considering individual performance curb at the race. B range from B1 to BJ where J is the number of segments for which time controls are available at considered competitions

Comment: The sum is done by absolute values. That is every value is made positive before the addition to the total sum.

The value sets of (A1, B1), (A2, B2) to (AJ, BJ) that generates the lowest Acc_Prognos_Error value is then used during the next competition.

If higher resolution is required, the above procedure is repeated between the values below- and above the optimum value in step two decimals. If even higher resolution is required, the same procedure is repeated over- and over again each time with one more decimal.

If several competitions have been performed, the proposed value of B is set to the average optimum value for each value set generated from the preceding competitions.

Prognosis algorithms for golf tournaments

In a preferred embodiment of the system 10 the distributed events can be a golf tournament. For golf, the algorithm gets more complicated because larger competitions are played over four rounds, each with 18 golf holes. For this kind of tournaments, it is important to consider earlier results on each golf hole since some golfers are performing well on specific golf holes and performing worse on others. It is therefore necessary to consider the results on each hole AND calibrate with the actual progress during the actual round compared with the other players.

Basic pre-conditions

During a golf tournament, 2-4 players are grouped together to what is called a "ball". The balls starts one after another with about 6-10 minutes delay. This lead to that some balls has finished all 18 holes while others are starting the competition. Structurally, very similar with the case for sport where the result is measured by used time instead of by used shots on the ball.

A complexity with golf tournaments is the large number of different types of competitions and the usage of a handicap-system.

The prognosis algorithm manages the handicap-factor by reducing the applicable handicap for each player and golf hole based on the slope for the actual golf course when performed results for each golf-hole are collected. For the remaining holes, the applicable handicap reduction for each hole is reduced for them as well making all computations based on net-results. If anyone would like to get the gross results presented, it is easily managed by adding the same handicap factor on each hole before the presentation is done. The applicable handicap is calculated on each hole by considering the player's actual handicap as well as the actual golf course slope factor, which is a table that calculates the real handicap for each player based on their individual handicap corrected by the level of the actual golf course.

When it comes to different types of golf competitions, a separate "software adaptor module" is created for each game type. The algorithm below is based on "stroke play". If for example "stableford competitions" is played instead, a linear transformation is done for both actual results on each hole as for the prognosis on the remaining holes presenting points- instead of used shots. Similar adaptation is created for other game types as for example "match play", "flag golf" etc.

<u>Parameters & Definitions</u>

Actual player	The player the prognosis is made for
N	Number of holes in the competition, which is 18 in this case.
L	Last hole reported for the actual player, L< N (if L = N, there is no need to calculate a prognosis for the actual player since the player has finished the competition / played all golf holes.
J	Number of holes for which a user (spectator- or player) would like to introduce "faked" results in order to get a prognosis of how the final result list probably will look like if the actual player really achieve the faked results. J can have values between 1 (try out faked result for next hole) and N-L (try out faked results for all remaining golf holes in the competition).
FScore(Player,M)	Faked score for actual player on golf hole number M.
FP(Player, M)	Prognosis on hole M based on faked sub-results for actual player. M is a value between L+1 and N
k(L, X)	Adjustable matrix of weight factors for each golf hole prognosis calculation. L represents the last golf hole played/reported for the actual player for which a prognosis calculation

is done. X identifies the variable value for each golf hole starting with the 1^{st} one and ending with the last one passed. A more detailed description of the k(,) matrix is described earlier regarding prognosis calculations for sports where the result is measured by used time. The structure of k(,) is identical for golf prognosis with the exception that time controls is replaced with golf holes.

P(Player, M)	Prognosis for actual player for not yet played/reported golf hole M, M is a value equal or between L+1 to N
Score(Player, 1)	Golf score at 1^{st} hole reported for actual player
Score(Player, 2)	Golf score at 2^{nd} hole reported for actual player
.	
.	
.	
Acore(Player, L)	Last reported golf score for actual player. Last score reported for hole L.
AScore(1)	Average score for 1^{st} hole for players who have reported results on hole M, M is the golf hole for which the prognosis is calculated for actual player.
AScore(2)	Average score for 2nd hole for players who have reported results on hole M, M is the golf hole for which the prognosis is calculated for actual player.
.	
.	
.	
AScore(M-1)	Average score for the golf hole directly before golf hole M for players who have reported results on hole M, M is the golf hole for which the prognosis is calculated for actual player.

Prognosis algorithm for remaining golf holes for actual player

$$P(\text{Player}, L+1) = \text{AScore}(L+1) * \left\{ \sum_{X=1}^{L} k(L,X) * \text{Score}(\text{Player},X) / \text{AScore}(X) \right\}$$

The algorithm is iterative and adaptive. That mean that if a prognosis shall be calculated for a player two golf holes ahead, step one is to calculate the prognosis for the next golf hole.

When the prognosis is calculated for the 2nd golf hole ahead, the prognosis value for the next golf hole is used as the actual result performed for actual player on that hole in the algorithm. The AScore is always calculated for the Athletes that have played/reported result for the golf hole for which the prognosis is calculated. The same procedure is repeated until the prognosis is calculated for the last golf hole. As always, when the actual Player has reached the next time control, all prognosis calculation for the remaining golf holes are recalculated based on the real scores achieved so far instead of prognosis values.

Selection of athletes to consider for the prognosis calculations

Since the performance level can be very different between golf players in the same competition, a recommendation is that the prognosis algorithm considers only a sub-set of golf players with similar performance level compared with actual athlete at the golf holes played by actual athlete so far. For example the five golf players with most similar accumulated golf score compared with actual athlete. When the prognosis algorithm is applied iterative for next golf hole, a new sub-set of golf players is selected with for example the five golf players with most similar accumulated golf scores compared with actual athlete for all golf holes played by actual athlete plus the next golf hole. The accumulated golf score for actual athlete is calculated as the real golf scores for the golf holes played plus the golf score prognosis for the hole not played yet. The same procedure is then repeated until the prognosis for the last golf hole has been calculated for actual athlete.

Faked prognoses based on proposed results for actual player

During a golf tournament, the athletes as well as the spectator's on- and off site can use the prognosis service. Both for the athletes and for the spectators, it is of interest to check-out how the likely end-result will change if the actual player creates a specific result on the golf hole played right now, the next hole etc. This knowledge can influence the player's strategy significantly. The calculation of this types of requests is described below.

Example – the user submit proposed results for next J holes

The calculation below is based on that spectators- or players would like to investigate how proposed results on one- or several golf holes not yet played probably will impact the final result list for the competition. The prognosis calculation for this case is described below:

Collection of proposed sub-results for next hole/holes for actual player:

For X = 1, J

FSore(Player, L+X) = proposed result for hole L+X from user

End

If L+J = N

In this case, the user has proposed faked results for all remaining golf holes in the competition. It is therefore not necessary to calculate any prognosis, only to present Leader Board for the competition with the accumulated result for the holes actual player has played and the faked results for the remaining golf holes together with the results (for players who has completed their golf round) and prognosis (for players that hasn't finished their golf round yet) for the other players.

If L+J < N

In this case, faked results have been proposed only for some of the remaining golf holes for actual player. The prognosis calculation for the golf holes not played and for which faked result hasn't been provided is done as follows:

$$\mathrm{FP}(\mathrm{Player}, L+J+1) = \mathrm{AScore}(L+J+1) * \left\{ \sum_{X=1}^{L+J} k(L,X) * \left(\mathrm{Score}(\mathrm{Player},X)/\mathrm{AScore}(X)\right) \right\}$$

If L+J+1 < N, then it is necessary to calculate prognosis for remaining golf holes. That is done by iterative usage of the above prognosis algorithm:

$$\mathrm{FP}(\mathrm{Player}, L+J+2) = \mathrm{AScore}(L+J+2) * \left\{ \sum_{X=1}^{L+J+1} k(L,X) * \left(\mathrm{Score}(\mathrm{Player},X)/\mathrm{AScore}(X)\right) \right\}$$

If L+J+2<N, then it is necessary to apply the iterative prognosis algorithm again changing L+J+2 with L+J+3. If there is still missing prognosis values for any remaining golf hole, the algorithm is used over-and-over again until a prognosis has been calculated for all remaining golf holes.

When prognosis is calculated for all remaining golf holes in the competition

Accumulate actual results achieved for actual player with all faked results provided and prognosis results for remaining golf holes. The sum is then presented on a "faked" Leader Board, which mean that actual players likely final result

if he/she really achieve the faked results presented with actual results/prognosis for all other players attending the competition.

Calibration of the weight matrix k(L,X)

Initially, the values at each column on same row of the k(L, X) matrix is increased linear with a specific value (the numerator is increased with the value 1) for every cell when X (index the columns) is stepped from 1 to L (see figure below). The reason for this is to give the relative performance change during later phases during the competition higher priority than the relative performance change earlier in the competition.

$$K(L,X) = \begin{pmatrix} 1 & & & & \\ 1/3 & 2/3 & & & \\ 1/6 & 2/6 & 3/6 & & \\ 1/10 & 2/10 & 3/10 & 4/10 & \\ 1/15 & 2/15 & 3/15 & 4/15 & 5/15 \end{pmatrix}$$

For an 18 hole golf competition, the complete matrix has 17 rows and 17 columns.

After the competition is finished, it is recommended to try-out other values for the k(L,X) matrix using other gradient of the curb as well as exponential and 1/exponential curbs.

The calibration algorithm is:

Every row in the matrix represents the weight factors utilized for prognosis calculation for a specific golf hole. Row 1 for prognosis calculations for hole nr 2, row 2 for prognosis calculation for hole nr 3 etc.

Calibration of row nr 1 in k(L,X) matrix

No calibration since the row contains only one factor and that the sum of the factors always shall be exactly 1 for every row in the matrix.

Calibration of row nr 2 in the K(L, X) matrix

For every new set of value combinations, the absolute difference between the prognosis score when the value-set is applied in the prognosis algorithm and the actual score for every golf player at golf hole nr 3 is accumulated and stored in the vector ERROR(Value_Set), where Value_Set represent the actual value set

used for the prognosis calculations (value combination in column 1 and 2 on row 2).

The Value_Set that has created the lowest accumulated absolute error value is selected as the optimum value set in the k(L, X) matrix for the next competition.

If a higher precision is requested for the calibration, the above procedure is repeated over and over again with new value sets each time with more decimals in the interval from just below- and above the value set that has resulted in lowest accumulated error so far.

If optimal value set has been calculated for similar competitions earlier, it is recommended to use the average value of optimized value sets during the next competition.

Calibration of row nr 3 in the K(L, X) matrix

For every new set of value combinations, the absolute difference between the prognosis score when the value-set is applied in the prognosis algorithm and the actual score for every golf player at golf hole nr 4 is accumulated and stored in the vector ERROR(Value_Set), where Value_Set represent the actual value set used for the prognosis calculations (value combination in column 1, 2 and 3 on row 3).

The Value_Set that has created the lowest accumulated absolute error value is selected as the optimum value set in the k(L, X) matrix for next competition.

If a higher precision is requested for the calibration, the above procedure is repeated over and over again with new value sets each time with more decimals in the interval from just below- and above the value set that has resulted in lowest accumulated error so far.

If optimal value set has been calculated for similar competitions earlier, it is recommended to use the average value of optimized value sets during the next competition.

Calibration of row nr 4- in the K(L, X) matrix

The same procedure as described for row 2-3 is repeated for all remaining rows in the K(L,X) matrix. For every new row, one more column is included in the value set.

Enhanced prognosis algorithm for golf tournaments played over several round on same golf course or for players for which statistics from earlier relevant competitions on the same golf course is available

If result information is available from earlier golf rounds/competitions on the same golf course, the prognosis algorithm is enhanced utilizing the fact that each golf hole is individual and match different players physical- and mental abilities differently. Some players achieve well on some holes and others play well on others. The following algorithm describe how this information is utilized:

$$P(\text{Player},L+1)=\text{Performance}(\text{Player},L+1)*\text{AScore}(L+1)*\left\{\sum_{X=1}^{L}k(L,X)*\text{Score}(\text{Player},X)\Big/\text{AScore}(X)\right\}$$

The Performance matrix is calculated based on earlier relevant results on actual golf course using the following algorithm:

$$\text{Performance}(\text{Player}, X) = \left\{\sum_{R=1}^{\text{Rounds}} [\, \text{Score}(\text{Player}, X, R) \,/\, \text{Par}(X) \,]\right\} * \text{Holes} \,/ \left\{\sum_{R=1,\,Y=1}^{\text{Rounds, Holes}} [\, \text{Score}(\text{Player},Y, R) \,/\, \text{Par}(Y) \,]\right\}$$

where:

Player	Actual player the prognosis is calculated for
X	Golf hole the value is calculated for
Y	Variable that index the golf holes
Holes	Number of golf holes on the golf course used during the competition for which the prognosis is calculated
R	Variable that index earlier golf rounds for which the golf scores for actual player are available
Rounds	Number of earlier golf rounds for which the golf scores for actual player is available
Score(Player, X, R)	The golf score actual player has achieved on golf hole X during previous golf round R.
Par(X)	The "par" value for the actual golf hole

The definition of previous golf rounds on the golf course includes as many rounds completed during applicable time period. The definition of applicable time period require that the golf course has not been modified during the time period and that the players performance level has been "similar" during the time period. The handicap should for example not been changed more that for example 25% during the time period.

Calculation of prognosis based on faked results on one or several holes for actual player

During a golf tournament, the athletes as well as the spectator's on- and off site can use the prognosis service. Both for the athletes and for the spectators, it is of interest to check-out how the likely end-result will change is a certain player creates a specific result on the golf hole played right now, the next hole etc. This knowledge can influence the player's strategy significantly. The calculation of these types of requests is described below.

If the player has played- and reported earlier applicable golf rounds on the same golf course, the earlier presented algorithm for calculation of faked prognosis for actual player becomes:

Collection of proposed sub-results for next hole/holes for actual player:

<u>For X = 1, J</u>
FSore(Player, L+X) = proposed result for hole L+X from user
End

<u>If L+J = N</u>

In this case, the user has proposed faked results for all remaining golf holes in the competition. It is therefore not necessary to calculate any prognosis, only to present Leader Board for the competition with the accumulated result for the holes actual player has played and the faked results for the remaining golf holes together with the results (for players who has completed their golf round) and prognosis (for players that hasn´t finished their golf round yet) for the other players.

<u>If L+J < N</u>

In this case, faked results have been proposed only for some of the remaining golf holes for actual player. The prognosis calculation for the golf holes not played and for which faked result hasn't been provided is done as follows:

$$FP(Player,L+J+1)=Performance(Player,L+J+1)*AScore(L+J+1)*\left\{\sum_{X=1}^{L+J}k(L,X)*(Score(Player,X)/AScore(X))\right\}$$

where Performance is calculated as above.

If L+J+1 < N, then it is necessary to calculate prognosis for remaining golf holes. That is done by iterative usage of the above prognosis algorithm:

$$FP(Player,L+J+2)=Performance(Player,L+J+2)*AScore(L+J+2)*\left\{\sum_{X=1}^{L+J+1}k(L,X)*(Score(Player,X)/AScore(X))\right\}$$

If L+J+2<N, then it is necessary to apply the iterative prognosis algorithm again changing L+J+2 with L+J+3. If there is still missing prognosis values for any remaining golf hole, the algorithm is used over-and-over again until a prognosis has been calculated for all remaining golf holes.

When prognosis is calculated for all remaining golf holes in the competition

Accumulate actual results achieved for actual player with all faked results provided and prognosis results for remaining golf holes. The sum is then presented on a "faked" Leader Board, which mean that actual players likely final result if he/she really achieve the faked results presented compared with actual results/prognosis for all other players attending the competition.

Transformation of prognosis golf hole results with higher resolution than what is displayed on Leader Board

The prognosis calculations generate normally golf hole prognosis results with a resolution of decimal numbers. The golf scores achieved is however always of type integers. The user of the prognosis service can therefore request the resolution (number of decimals) in the presented result. If a user request integer presentation (no decimals), the following algorithm is applied in order to generate as close prognosis value for each golf hole as possible and make sure the accumulated prognosis score become as close to the accumulated result from the prognosis algorithm as possible for all remaining golf holes.

P(Player, L+1)	Prognosis value for the first golf hole for which a prognosis is calculated for the actual player, i.e. the golf hole that directly follows the last one played / reported. The prognosis is calculated with as many decimals that the organizer of the event requests.
PP(Player, L+1)	Prognosis presented to the user. The result is presented in integers (no decimals)
RO_SUM	Round Off Sum, this is the accumulated value of the round off made on all previous prognoses presented holes.

First prognosis golf hole

If the decimal part of P(Player, L+1) < 0.5, PP(Player, L+1) = closest lower integer number to P(Player, L+1). In other case, PP(Player, L+1) = closest higher integer number to P(Player, L+1).

RO_SUM = P(Player, L+1) - PP(Player, L+1)

2nd prognosis golf hole

If the decimal part of {RO_SUM + P(Player, L+2)} < 0.5, PP(Player, L+2) = closest lower integer number to {RO_SUM + P(Player, L+2)}. In other case, PP(Player, L+2) = closest higher integer number to {RO_SUM + P(Player, L+2)}.

RO_SUM = {RO_SUM + P(Player, L+2)} - PP(Player, L+2)

3rd prognosis golf hole

The procedure for the 2nd golf hole is then repeated for all reminding prognosis for actual player. The only difference is that (L+2) is exchanged to (L+3) for prognosis hole 3, (L+4) for prognosis hole 4 and so forth.

Technical implementation of synchronized time measurement where the collection of time results is done from geographical distributed sensors trough a packet switching based IP network. The whole network- or part of it can be cellular. The patent includes also the process of secure identification of sensors and data transmission of the time result data.

The time measuring sensors are either mobile phones/computers with internal clock, other kind of time measuring devices either connected to a mobile phone or computer with communication facilities or with own mobile communica-

tion module with ability to communicate by using packet-switched oriented networks.

Before the collection of measuring data, the event organizer specify the A-number and/or the IP-address for all communication devices that will distribute time result data to the computer that collect- and process the results before they are presented to the audience.

Synchronization of time measurements from distributed sensors

Before the time measurement begins, a sync-pulse is sent to each time measuring sensor through a circuit switched network, which can be either a fixed- or cellular network (se below figure). The absolute time is stored for each sensor when the sync pulse is transmitted. If the transmission of the sync pulse is based on broadcast transmission, the distributed sync pulse is of course sent at the same time to all sensors. When the sensors receive the sync pulse, the time measuring clock is read and the value transmitted back either trough a circuit- or packet switched network to the computer that distributed the sync pulse. For each sensor, a calibration value Delta(Sensor) is calculated as the difference between the time value returned from the sensor and the system clock time when the synchronization signal was distributed to the sensor.

In figure 8 there is disclosed a flow chart of synchronization of time measurement data from distributed sensors.

In order to achieve high security, the A-number and/or IP address is for the sensor is verified before the received data is accepted and the correction Delta are calculated. For very high security, user_ID and password or even digital certificated is used in the same way as described earlier.

The procedure is repeated for all sensors used in the competition. If the Send_Time_Request signal is sent through a broadcast channel, it's enough to make one transmission of the signal to calibrate the received clock values from all sensors. Every sensor distributes back the measured time when the sync pulse was received.

When a sensor detects a clock value for an athlete, the value is transferred to the display process. Before the value is displayed, the correction value Delta for the actual sensor is subtracted from the measured value (see figure below).

In figure 9 there is disclosed a flow chart for correction of measured time results before presentation.

In order to secure correct data, a control that the sensor has valid A-number and IP address is made before the measured data is accepted and the

correction calculated. During the check, a parity check is made based on the actual protocol used during the transmission in order to verify that the time value has not been disturbed during the transmission.

In figure 2 there is disclosed a flow chart of a method fro providing results/information and prognosis in real time from geographically distributed events. The method is performed with the aid of a system comprising a number of wireless communication devices 12_1, ..., 12_n (see figure 1), at least one of which is located at each geographically distributed event. The method begins at block 30. At block 32 the method continues with the step: with the aid of said wireless communication devices, to transmit results/information to at least one control means. The method continues at block 34 with the step: to store said results/information in a first memory system connected to said at least one control means. The next step, at block 36, is to, based on said results/information, calculate a prognosis of an outcome of said events with the aid of a recursive algorithm. The method continues at block 38 with the step: to store said prognosis in a second memory system connected to said at least one control means. The next step, at block 40, is to transmit said results/information and/or prognosis to users of the system via a mobile or fixed network. The method is completed at block 42.

In figure 4 there is disclosed the principle with distributed servers, databases and modem pools for different regions and network connection types.

In figure 5 there is disclosed the principle for data storage in the distributed databases in order to be able to manage data transmission/collection of sport results and games & gaming information to/from very large number of users during the very short time periods required especially by the interactive games & gaming applications. In this example, all necessary data for gamblers is stored in each partition of the database where the partitions are based on actual tip during last interactive session. This database structure makes it possible to distribute tip-requests directly to the gamblers that made the correct tip during last game session (called approved gamblers) without wasting time running through selection analysis in order to identify which gamblers actually are approved. It is only to select the right partition at all distributed databases. Since the user-specific information that shall be presented to these approved gamblers when the request for a new tip is made is already pre-processed, even more valuable time is saved. Figure 13-16 describes this through sequence diagrams. It is however possible to avoid duplicate storage of redundant information by using references from each database partition to gambler specific data instead of storing the same data at several partitions.

In figure 6 there is disclosed a table illustrating the prognosis calculation The prognosis calculation compares the progress between every pair of time controls for the actual athlete (B in this example) and the athlete/athletes that has passed the time control for which the prognosis is calculated (time control 6 – the Goal which only athlete A has passed in this example). Each of the comparison results is multiplied with a weight factor k(,). The comparison results represents the actual tendency between actual athlete (B in this example) and the athlete/athletes passed next time control (A in this example) for every pair of time controls passed so far. By multiplying the "tendency" sum with the mean time between the next- and previous passed time controls (time control 6 and 5 in this example) for the athletes who has passed the next time control (only athlete A in this example) generates the prognosis time for actual athlete (B in this example) between the time control for which the prognosis is calculated (time control 6 in this example) and the preceding time control (time control 5 in this example). By adding the used time for actual athlete (athlete B in this example) from start to time control 5 with the prognosis time for actual athlete between time control 5 and 6, the absolute prognosis time reaching time control 6 for actual athlete B is generated.

The correlation is calculated for each pair of part time controls both A and B in this example has passed. By using weight factors for all time controls, the algorithm makes it possible to give higher priority to the correlation between the athletes at the later part of the race. By using this information, the algorithm estimate the time for athlete B from time control 5 to the goal by a calculation assuming the tendency between the athletes progress will remain during the last part of the race.

In figure 7 there is disclosed a track with time controls. In this example is the number of time controls N=7, where the last time control is at the finish line.

In figure 3 there is disclosed a schematic diagram of some computer program products according to the present invention. There is disclosed n different digital computers $100_1, \ldots, 100_n$, wherein n is an integer. There is also disclosed n different computer program products $102_1, \ldots, 102_n$, here shown in the form of compact discs. The different computer program products $102_1, \ldots, 102_n$ are directly loadable into the internal memory of the n different digital computers $100_1, \ldots, 100_n$. Each computer program product $102_1, \ldots, 102_n$ comprises software code portions for performing some or all the steps of figure 2 when the product(s) $102_1, \ldots, 102_n$ is/are run on said computer(s) $100_1, \ldots, 100_n$. Said computer program products $102_1, \ldots, 102_n$ can e. g. be in the form of floppy disks, RAM disks, magnetic tapes, opto magnetical disks or ay other suitable products.

The invention is not limited to the embodiments described in the foregoing. It will be obvious that many different modifications are possible within the scope of the following claims.

CLAIMS

1. A system operable to manage and provide results-, prognosis and games & gaming information in real time for geographically distributed sport events, wherein said system comprises a number of wireless communication devices, each of which is identified with a unique identification code and at least one located at each geographically distributed event, for transmitting results/information to at least one control means, which is connected to a first memory system for storing said results/information, a to said at least one control means and to said memory system connected computing means operable to, based on said results/information, calculate a prognosis with the aid of an iterative and adaptive algorithm, a to said computing means connected second memory system for storing said prognosis, wherein said second memory means is connected to said at least one control means which in turn transmit said results/information and/or prognosis and/or request for tips to users of said system via mobile or fixed networks.

2. A system operable manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 1, **characterized in** that each memory system comprises a number of geographically distributed databases.

3. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 1 or Claim 2, **characterized in** that said system also comprises different types of geographically distributed sensors operable to collect different types of information from said geographically distributed events.

4. A system operable manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 3, **characterized in** that one type of sensor is a time measuring sensor, and in that an internal clock of an individual sensor is calibrated through a circuit switched synchronization pulse.

5. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 3 or Claim 4, **characterized in** that one type of sensor can be a biometric sensor.

6. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 1 – 5, **characterized in** that said identification code is based on A-number and/or IP-address and/or individual device identification code.

7. A system operable to manage and provide results-, prognosis and games & gaming information real time from geographically distributed events according to Claim 6, **characterized in** that said A-number and/or IP-address and/or individual device identification code is combined with user and password identification.

8. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 6, **characterized in** that said A-number and/or IP-address and/or individual device identification code is combined with user and password identification or electronic certificate.

9. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distribute events according to any one of Claims 1 – 8, **characterized in** that said distributed events are sport events where the performance is measured by used time, and in that said iterative and adaptive algorithm for calculating a prognosis can be expressed as:

$$P\,(\text{Athlete}, L+1) = \text{Time}\,(\text{Athlete}, L) + \text{ATime}\,(L+1) * \sum_{X=1}^{L} \{k\,(L, X) * \text{Time}\,(\text{Athlete}, X)/\text{ATime}(X)\},$$

wherein N is the number of time controls in the competition; L is the number of the last time control the athlete in question has passed; k (L, S) is an adjustable matrix of variables for each time control prognosis calculation; P (Athlete, M) is the prognosis for the athlete in question at time control M, wherein M is an integer and L + 1 ≤ M ≤ N; Time(Athlete, L) is measured time between the last time control (L) the athlete in question has passed and the preceding one, and ATime (M) is the average time between time control M and the preceding time control for athletes who has passed time control M.

10. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 9, **characterized in** that the initial values of the matrix k (L, X) us calculated using the following algorithm:

$$k\,(L,X) = X \Big/ \left\{ \sum_{y=1}^{L} y \right\},$$

wherein L is the number of the time control last passed by the athlete for which the prognosis is calculated, X is the number of time controls for which the tendency is calculated between the athlete in question and all other athletes that has passed the time control for which the prognosis is calculated (L + 1).

11. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 9 – 10, **characterized in** that said recursive algorithm for calculating a prognosis is complemented with individual weighting factors for each athlete, wherein said weighting factors are based on the athletes individual performance characteristics during similar races.

12. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 11, **characterized in** that said computing means calibrates said k (L, X) matrix and said weighting factors after a competition/race is finished.

13. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 1 - 8, **characterized in** that said distributed events is a golf tournament, and in that said recursive algorithm for calculating a prognosis can be expressed as:

$$P\,(\text{Player}, L+1) = \text{AScore}\,(L+1) * \left\{ \sum_{X=1}^{L} k\,(L,X) * \text{Score}\,(\text{Player}, X) / \text{AScore}\,(X) \right\},$$

wherein N is the number of holes in a competition; L is the last hole reported for the player in question; k (L, X) is an adjustable matrix of variables for each golf hole prognosis calculation, and AScore (Player, L) is last reported golf score for the player in question for hole L.

14. A system operable to manage and provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 13, **characterized in** that said computing means calibrates said k (L, X) matrix after the competition is finished.

15. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events with the aid of a system comprising a number of wireless communication devices, at least on of which is located at each geographically distributed event, wherein said method comprises the steps of:
- with the aid of said wireless communication devices, to transmit results/information to at lest one control means;
- to store said results/information in a first memory means connected to said at least one control means;
- to, based on said results/information, calculate a prognosis of an outcome of said events with the aid of an iterative and adaptive algorithm;
- to store said prognosis in a second memory means connected to said at least one co troll means; and
- to transmit said results/information and/or prognosis to users of said system via a mobile or fixed network.

16. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 15, **characterized in** that each memory system comprises a number of geographically distributed databases, wherein said storing steps consists of:
- to store said results/information in said first databases; and
- to store said prognosis in said second databases.

17. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 15 or Claim 16, **characterized in** that said system also comprises different types of geographically distributed sensors, wherein the method also comprises the steps:
- said sensors collects different types of information from said geographically distributed events; and
- to send said collected information to said at least one control means.

18. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 17, **characterized in** that one type of sensor is a time measuring sensor, and in that said method also comprises the step:
- to calibrate an internal clock of an individual time measuring sensor through a circuit switched synchronization pulse.

19. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 17 or Claim 18, **characterized in** that one type of sensor is a biometric sensor.

20. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 15 - 19, **characterized in** that each wireless communication device is identified with a unique identification code based on A-number and/or IP-address and/or individual device identification code.

21. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 20, **characterized in** that said A-number and/or IP-address and/or individual device identification code is combined with user id and password identification and/or electronic certificate.

22. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 15 - 21, **characterized in** that said distributed events are sport events where the performance is measured by used time, and in that said calculation step is performed by:

- calculating said prognosis by using the iterative and adaptive algorithm:

$$P(\mathrm{Athlete}, L+1) = \sum_{X=1}^{L} \mathrm{Time}(\mathrm{Athlete}, X) + \mathrm{ATime}(L+1) * \sum_{X=1}^{L} \{k(L, X) * \mathrm{Time}(\mathrm{Athlete}, X) / \mathrm{ATime}(X)\}$$

wherein N is the number of time controls in the competition; L is the number of the last time control the athlete in question has passed; k (L, S) is an adjustable matrix of variables for each time control prognosis calculation; P (Athlete, M) is the prognosis for the athlete in question at time control M, wherein M is an integer and L + 1 ≤ M ≤ N; Time(Athlete, L) is measured time between the last time control (L) the athlete in question has passed and the preceding one, and ATime (M) is the average time between time control M and the preceding time control for athletes who has passed time control M.

23. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 22, **characterized in** that said method also comprises the step:
- to calculate the initial values of the matrix k (L, X) according to the following algorithm:

$$k(L, X) = X \Big/ \left\{ \sum_{Y=1}^{L} Y \right\},$$

wherein L is the number of the time control last passed by the athlete for which the prognosis is calculated, X is the number of time controls for which the tendency is calculated between the athlete in question and all other athletes that has passed the time control for which the prognosis is calculated (L + 1).

24. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 22 - 23, **characterized in** that said recursive algorithm for calculating a prognosis is complemented with individual weighting factors for each athlete, wherein said weighting factors are based on the athletes individual performance characteristics during similar races.

25. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 24, **characterized in** that said method also comprises the step:
- with the aid of said computing means, to calibrate said k (L, X) matrix and said weighting factors after a competition/race is finished.

26. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to any one of Claims 15 - 21, **characterized in** that said distributed events are a golf tournament an in that said calculation step is performed by:
- calculating said prognosis by using the iterative and adaptive algorithm:

$$P(\text{Player}, L+1) = \text{AScore}(L+1) * \sum_{X=1}^{L} \{k(L, X) * \text{Score}(\text{Player}, X) / \text{AScore}(X)\}$$

wherein N is the number of holes in a competition; L is the last hole reported for the player in question; k (L, X) is an adjustable matrix of variables for each golf

hole prognosis calculation; and AScore (Player, L) is last reported golf score for the player in question for hole L.

27. A method for management and to provide results-, prognosis and games & gaming information in real time from geographically distributed events according to Claim 26, **characterized in** that said method also comprises the step:
- with the aid of said computing means, to calibrate said k (L, X) matrix after the competition is finished.

28. At least one computer program product (102_1, ..., 102_n), directly loadable into the internal memory of at least one digital computer (100_1, ..., 100_n), comprising software code portions for performing the steps of Claim 14 when said at least one product (102_1, ..., 102_n) is/are run on said at least one computer (100_1, ..., 100_n).

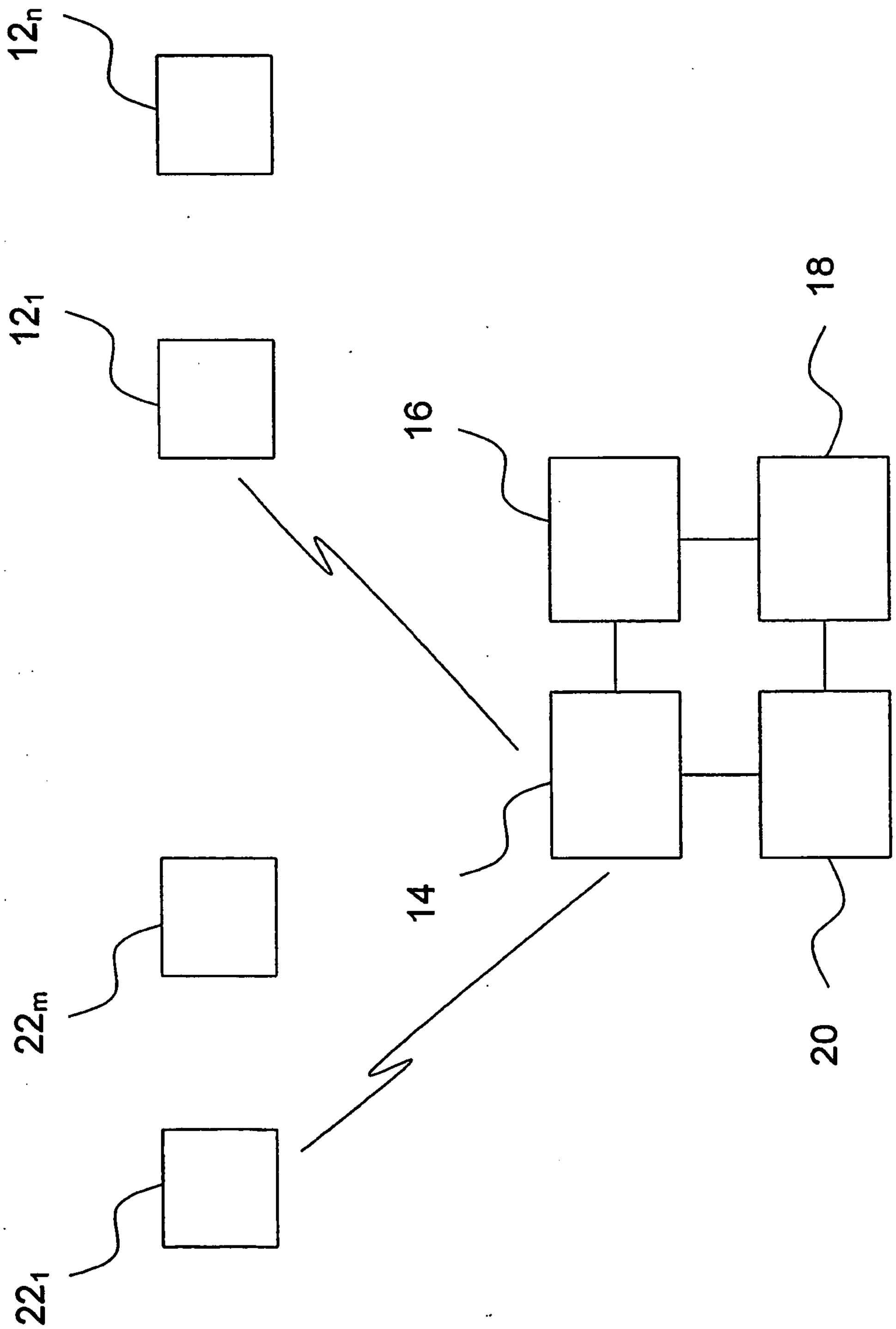


Fig. 1

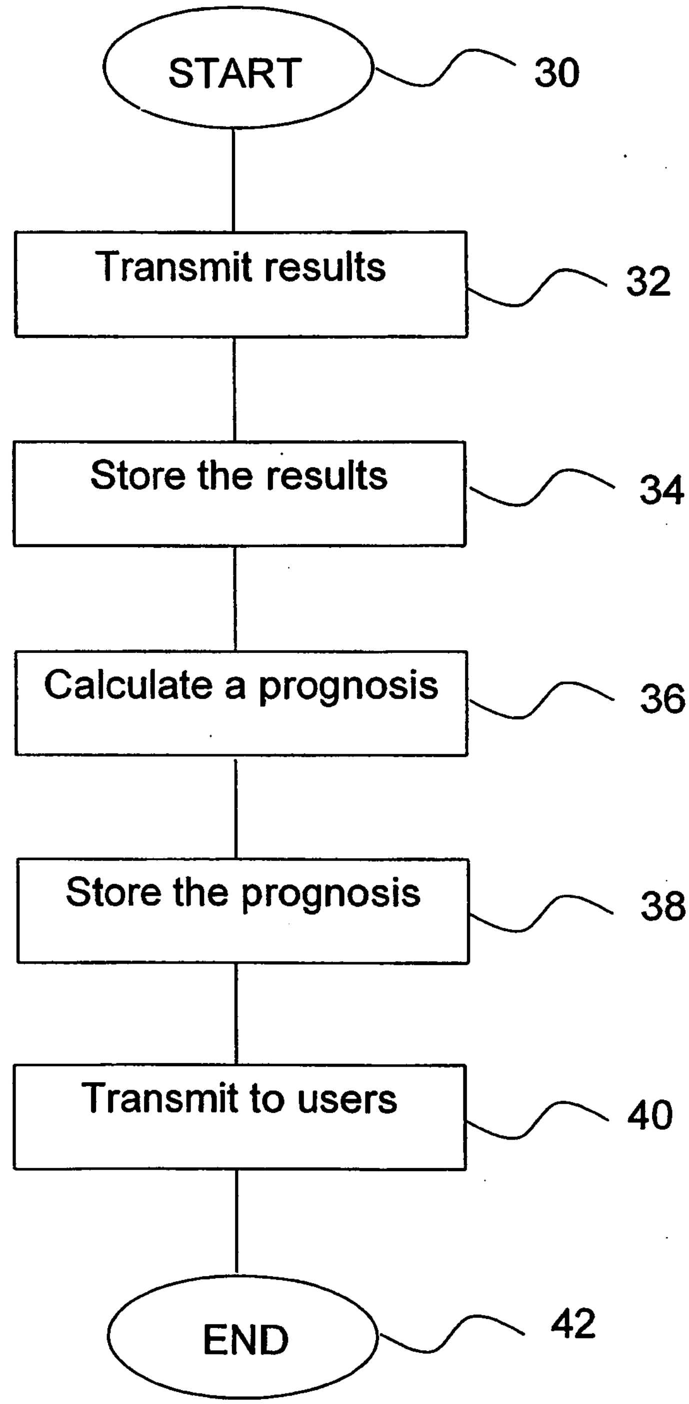

START
30
Transmit results
32
Store the results
34
Calculate a prognosis
36
Store the prognosis
38
Transmit to users
40
END
42

Fig. 2

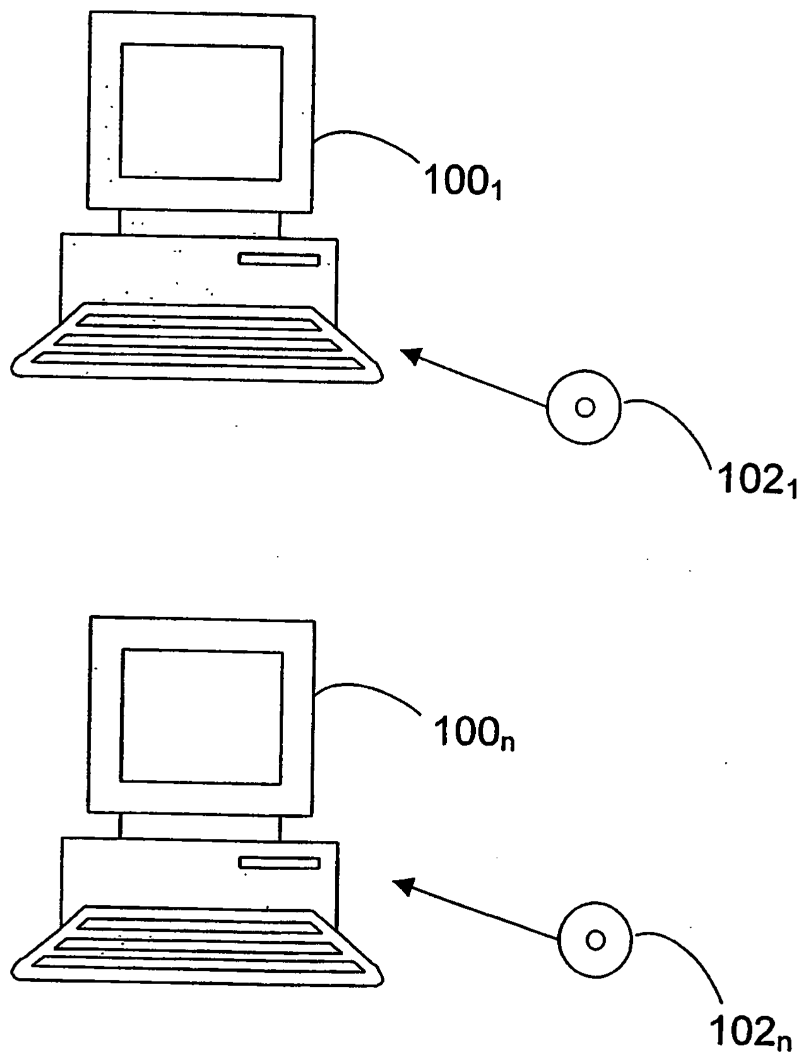


Fig. 3

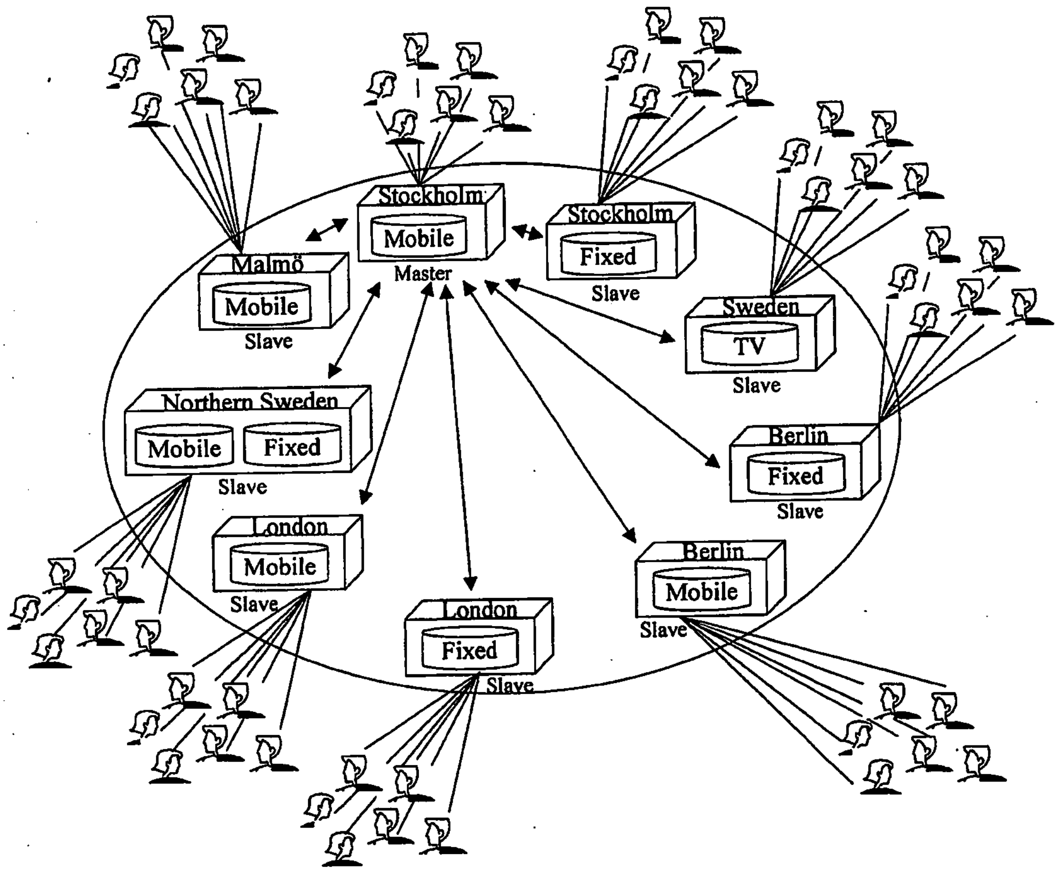

Stockholm
Mobile
Master
Stockholm
Fixed
Slave
Malmö
Mobile
Slave
Sweden
TV
Slave
Northern Sweden
Mobile
Fixed
Slave
Berlin
Fixed
Slave
London
Mobile
Slave
Berlin
Mobile
Slave
London
Fixed
Slave

Fig. 4

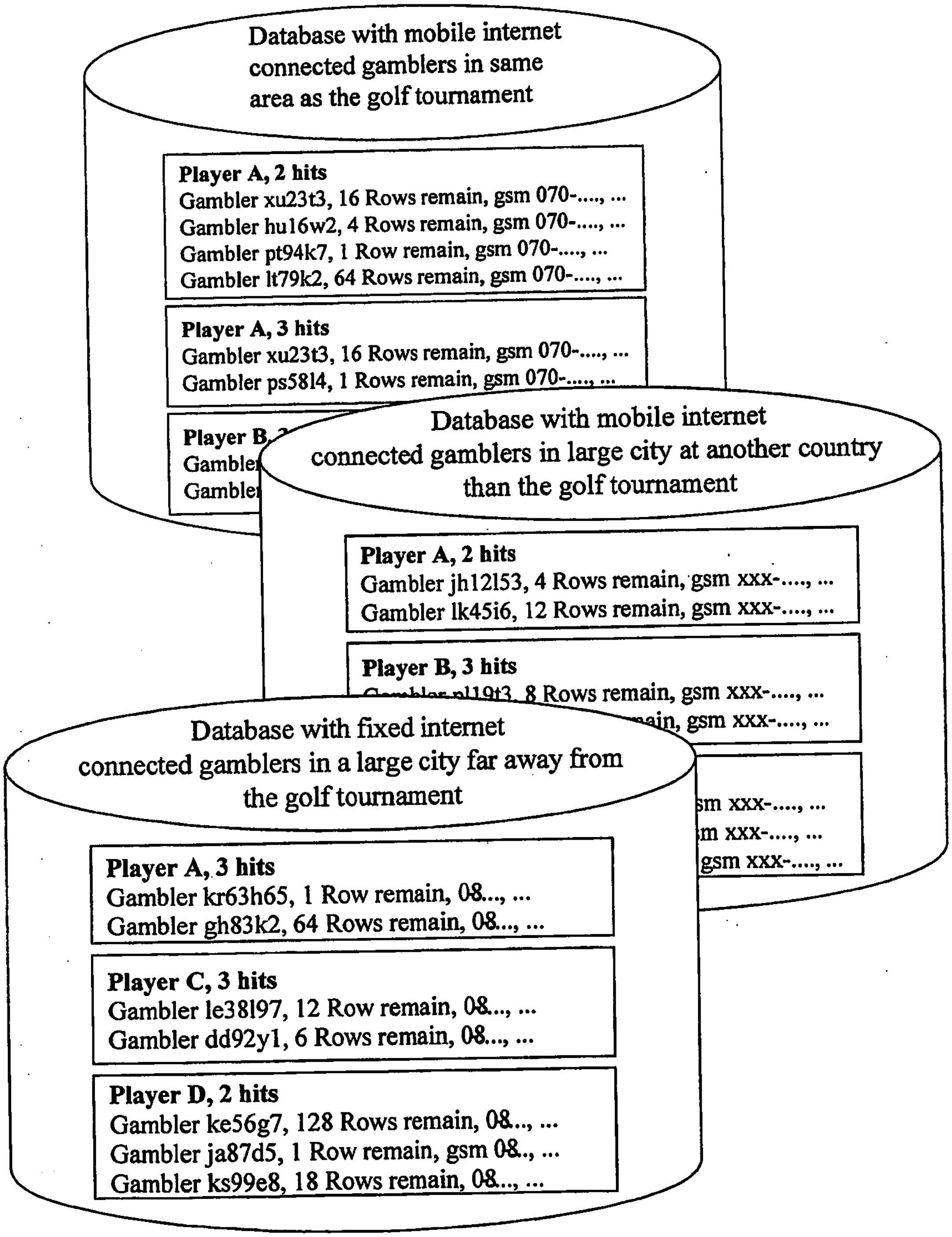

Database with mobile internet connected gamblers in same area as the golf tournament
Player A, 2 hits
Gambler xu23t3, 16 Rows remain, gsm 070-...., ...
Gambler hu16w2, 4 Rows remain, gsm 070-...., ...
Gambler pt94k7, 1 Row remain, gsm 070-...., ...
Gambler lt79k2, 64 Rows remain, gsm 070-...., ...
Player A, 3 hits
Gambler xu23t3, 16 Rows remain, gsm 070-...., ...
Gambler ps58l4, 1 Rows remain, gsm 070-...., ...
Database with mobile internet connected gamblers in large city at another country than the golf tournament
Player A, 2 hits
Gambler jh12l53, 4 Rows remain, gsm xxx-...., ...
Gambler lk45i6, 12 Rows remain, gsm xxx-...., ...
Player B, 3 hits
Database with fixed internet connected gamblers in a large city far away from the golf tournament
Player A, 3 hits
Gambler kr63h65, 1 Row remain, 08..., ...
Gambler gh83k2, 64 Rows remain, 08..., ...
Player C, 3 hits
Gambler le38l97, 12 Row remain, 08..., ...
Gambler dd92y1, 6 Rows remain, 08..., ...
Player D, 2 hits
Gambler ke56g7, 128 Rows remain, 08..., ...
Gambler ja87d5, 1 Row remain, gsm 08.., ...
Gambler ks99e8, 18 Rows remain, 08..., ...

Fig. 5

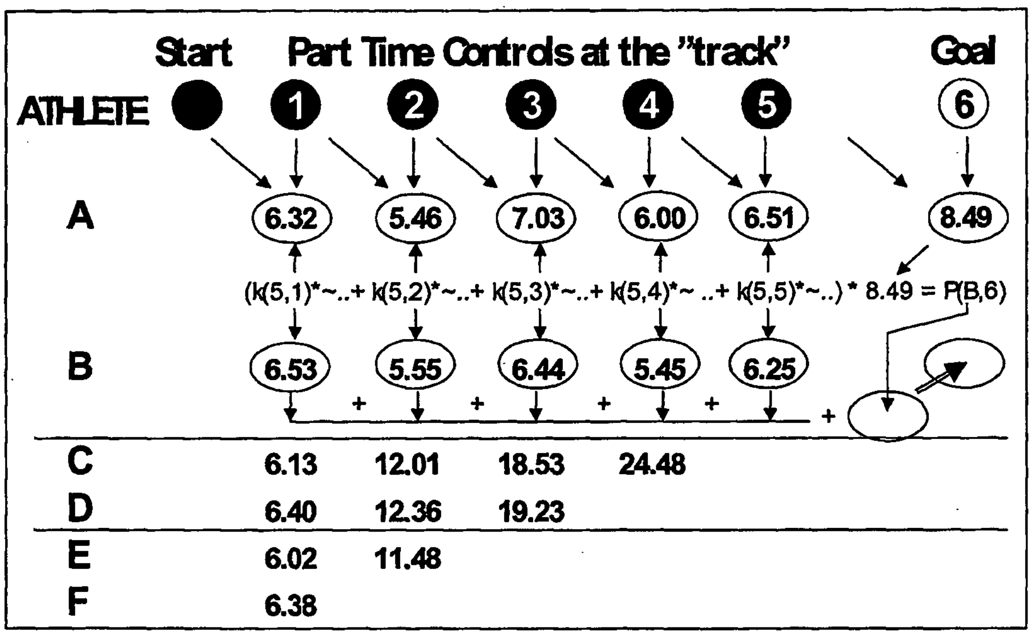

Start
Part Time Controls at the "track"
Goal
ATHLETE
1
2
3
4
5
6
A
6.32
5.46
7.03
6.00
6.51
8.49
(k(5,1)*~..+ k(5,2)*~..+ k(5,3)*~..+ k(5,4)*~ ..+ k(5,5)*~..) * 8.49 = P(B,6)
B
6.53
5.55
6.44
5.45
6.25
+ + + + +
C 6.13 12.01 18.53 24.48
D 6.40 12.36 19.23
E 6.02 11.48
F 6.38

Fig. 6

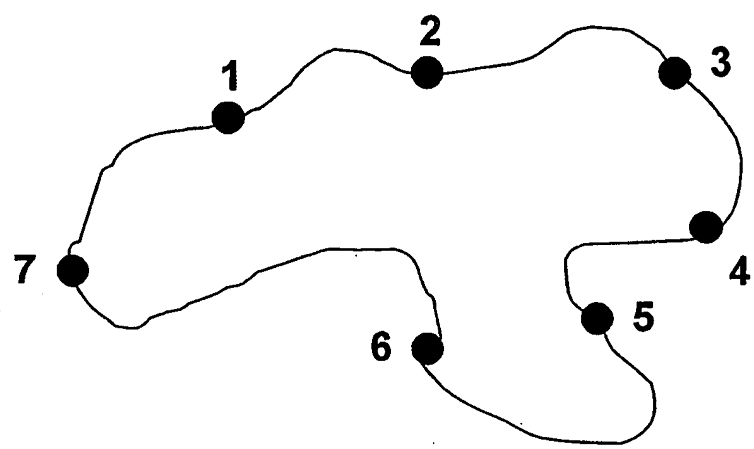


Fig. 7

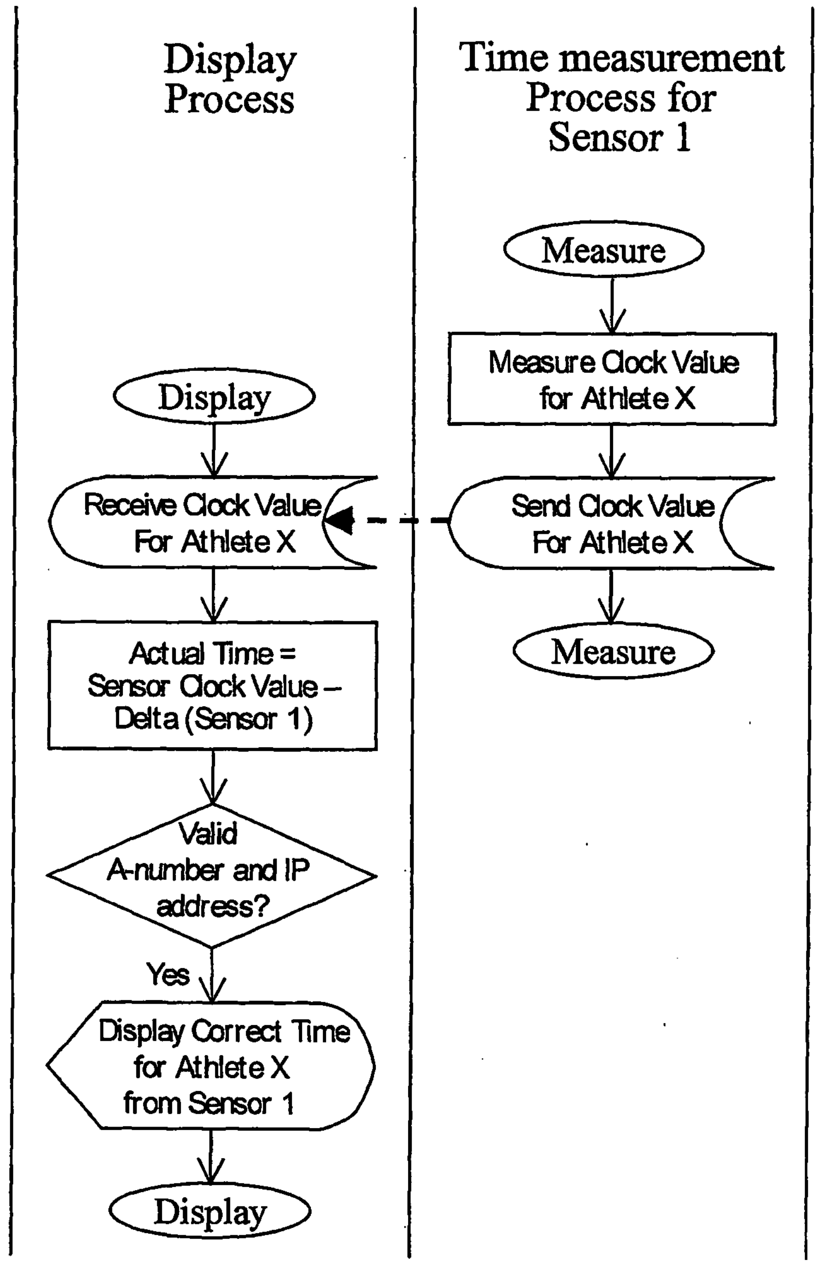

Display
Process
Time measurement
Process for
Sensor 1
Measure
Measure Clock Value
for Athlete X
Display
Receive Clock Value
For Athlete X
Send Clock Value
For Athlete X
Measure
Actual Time =
Sensor Clock Value –
Delta (Sensor 1)
Valid
A-number and IP
address?
Yes
Display Correct Time
for Athlete X
from Sensor 1
Display

Fig. 8

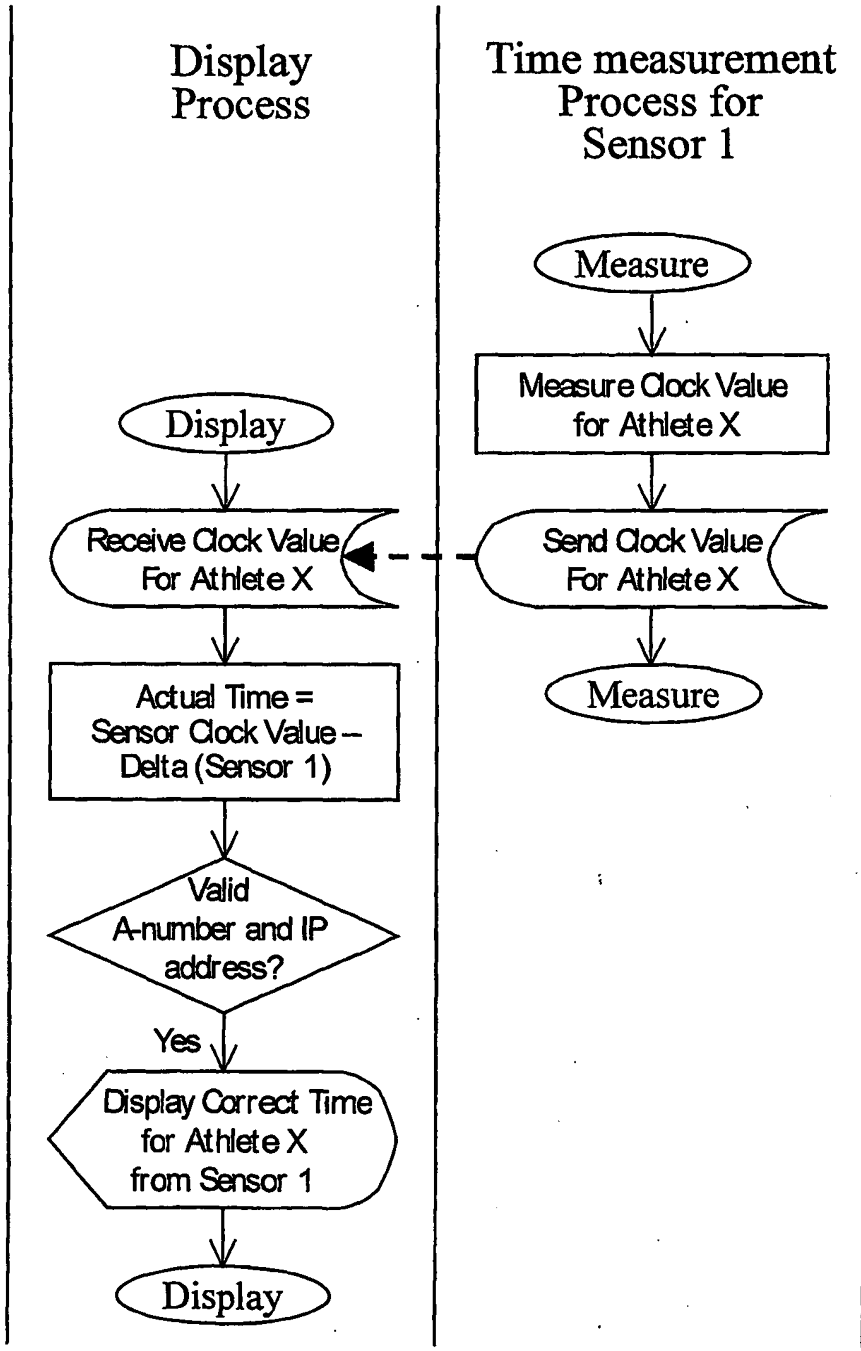

Display Process
Time measurement Process for Sensor 1
Measure
Measure Clock Value for Athlete X
Display
Receive Clock Value For Athlete X
Send Clock Value For Athlete X
Measure
Actual Time = Sensor Clock Value – Delta (Sensor 1)
Valid A-number and IP address?
Yes
Display Correct Time for Athlete X from Sensor 1
Display

Fig. 9

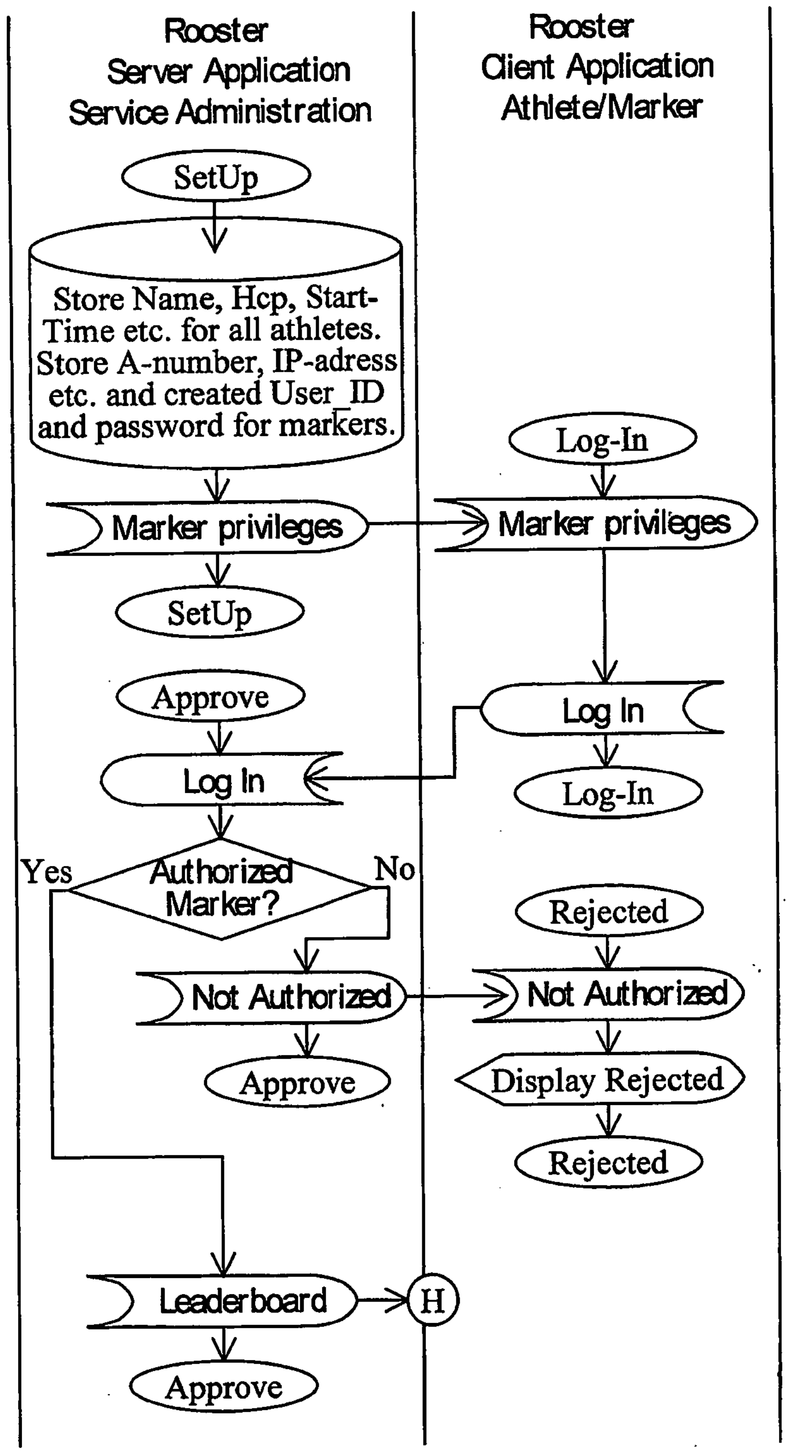

Rooster
Server Application
Service Administration
Rooster
Client Application
Athlete/Marker
SetUp
Store Name, Hcp, Start-Time etc. for all athletes. Store A-number, IP-adress etc. and created User_ID and password for markers.
Log-In
Marker privileges
Marker privileges
SetUp
Approve
Log In
Log In
Log-In
Yes
Authorized Marker?
No
Rejected
Not Authorized
Not Authorized
Approve
Display Rejected
Rejected
Leaderboard
H
Approve

Fig. 10

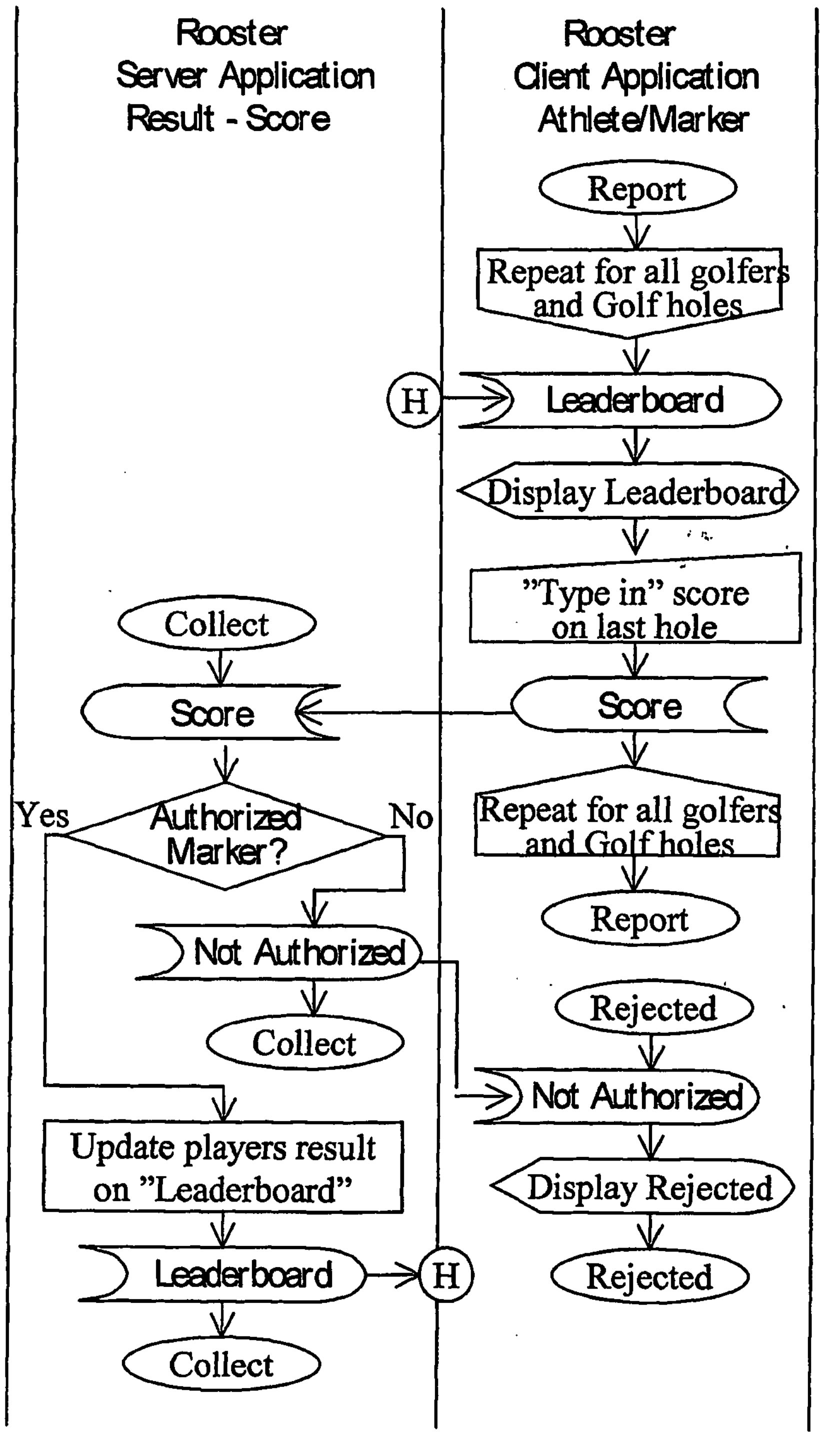

Rooster
Server Application
Result - Score
Rooster
Client Application
Athlete/Marker
Report
Repeat for all golfers and Golf holes
H
Leaderboard
Display Leaderboard
"Type in" score on last hole
Collect
Score
Score
Yes
Authorized Marker?
No
Repeat for all golfers and Golf holes
Report
Not Authorized
Rejected
Collect
Not Authorized
Update players result on "Leaderboard"
Display Rejected
Leaderboard
H
Rejected
Collect

Fig. 11

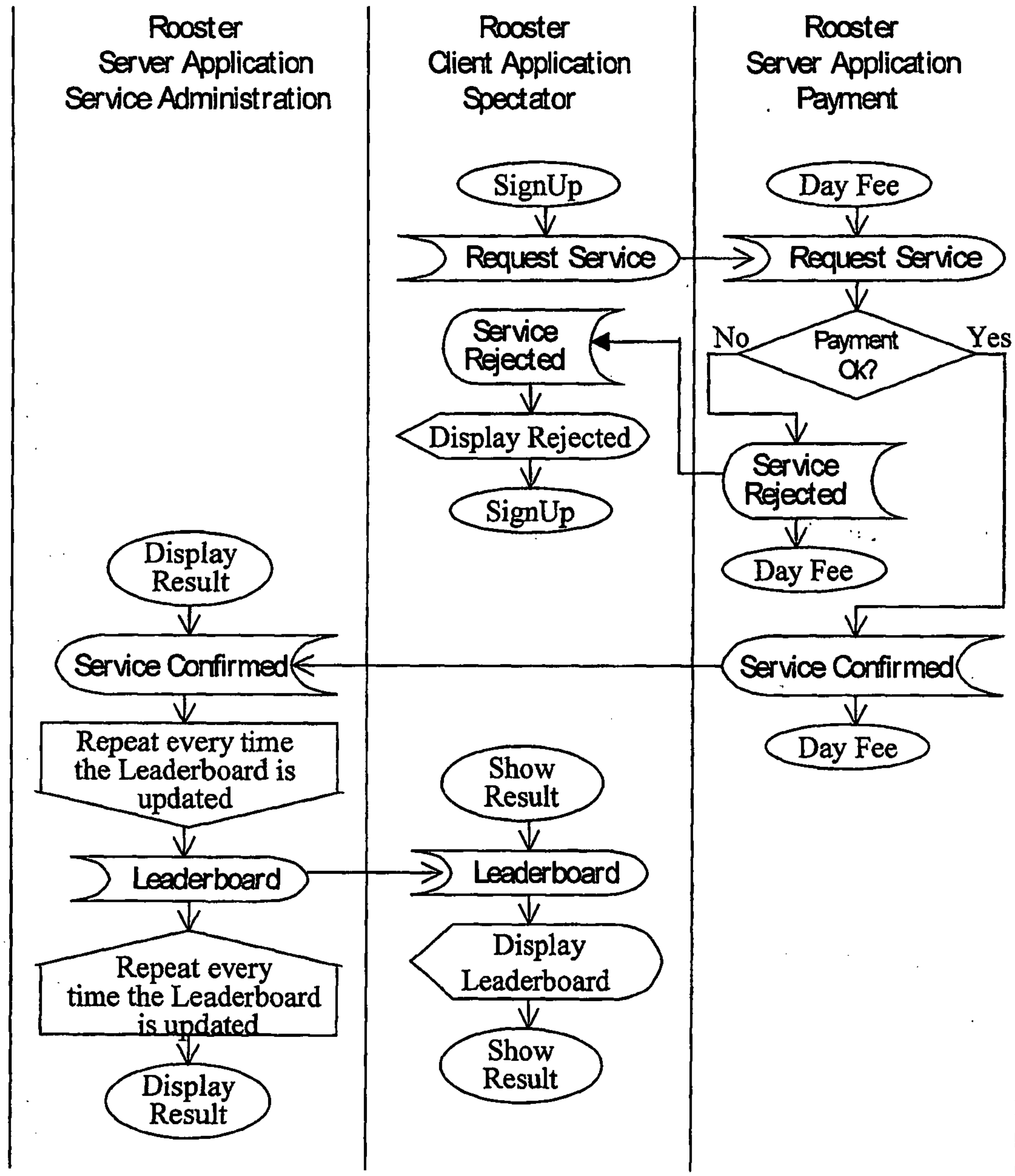

Rooster
Server Application
Service Administration
Rooster
Client Application
Spectator
Rooster
Server Application
Payment
SignUp
Request Service
Day Fee
Request Service
Service Rejected
No
Payment OK?
Yes
Display Rejected
Service Rejected
SignUp
Day Fee
Display Result
Service Confirmed
Service Confirmed
Day Fee
Repeat every time the Leaderboard is updated
Show Result
Leaderboard
Leaderboard
Repeat every time the Leaderboard is updated
Display Leaderboard
Show Result
Display Result

Fig. 12

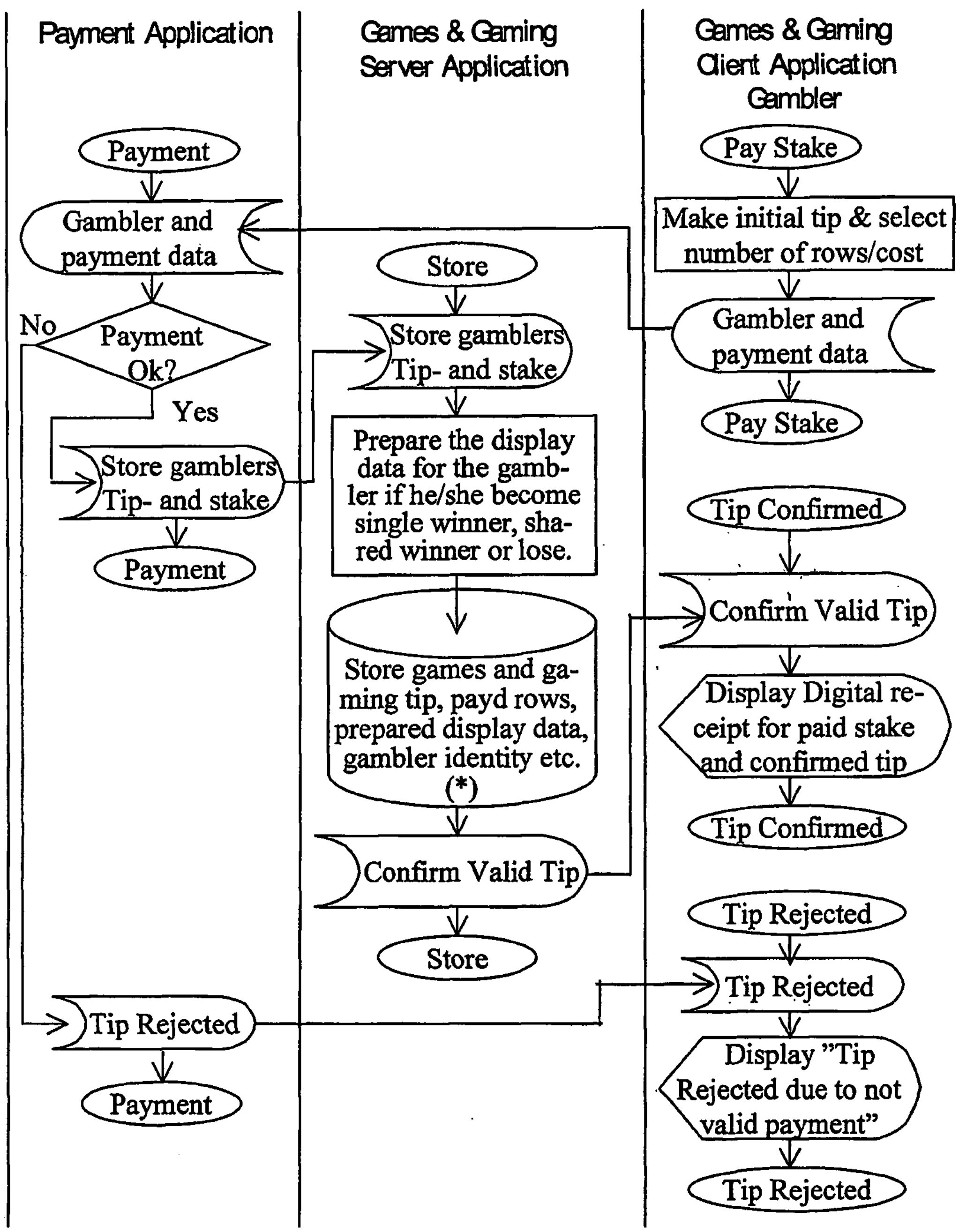
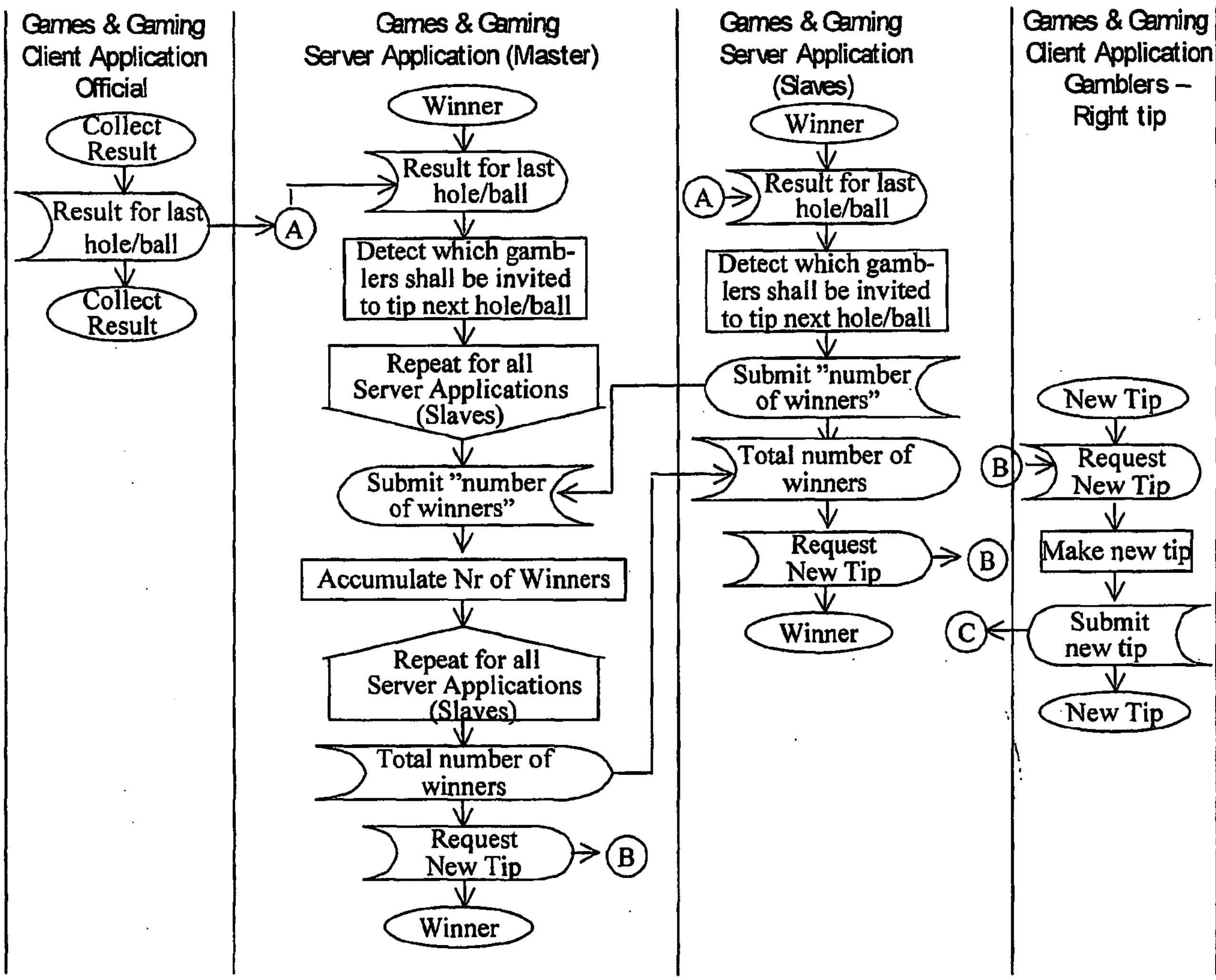

Payment Application
Games & Gaming Server Application
Games & Gaming Client Application Gambler
Payment
Gambler and payment data
No
Payment Ok?
Yes
Store gamblers Tip- and stake
Payment
Tip Rejected
Payment
Store
Store gamblers Tip- and stake
Prepare the display data for the gambler if he/she become single winner, shared winner or lose.
Store games and gaming tip, payd rows, prepared display data, gambler identity etc. (*)
Confirm Valid Tip
Store
Pay Stake
Make initial tip & select number of rows/cost
Gambler and payment data
Pay Stake
Tip Confirmed
Confirm Valid Tip
Display Digital receipt for paid stake and confirmed tip
Tip Confirmed
Tip Rejected
Tip Rejected
Display "Tip Rejected due to not valid payment"
Tip Rejected

Fig. 13



Games & Gaming Client Application Official
Collect Result
Result for last hole/ball
Collect Result
Games & Gaming Server Application (Master)
Winner
Result for last hole/ball
Detect which gamblers shall be invited to tip next hole/ball
Repeat for all Server Applications (Slaves)
Submit "number of winners"
Accumulate Nr of Winners
Repeat for all Server Applications (Slaves)
Total number of winners
Request New Tip
Winner
Games & Gaming Server Application (Slaves)
Winner
Result for last hole/ball
Detect which gamblers shall be invited to tip next hole/ball
Submit "number of winners"
Total number of winners
Request New Tip
Winner
Games & Gaming Client Application Gamblers – Right tip
New Tip
Request New Tip
Make new tip
Submit new tip
New Tip
A
B
C

Fig. 14

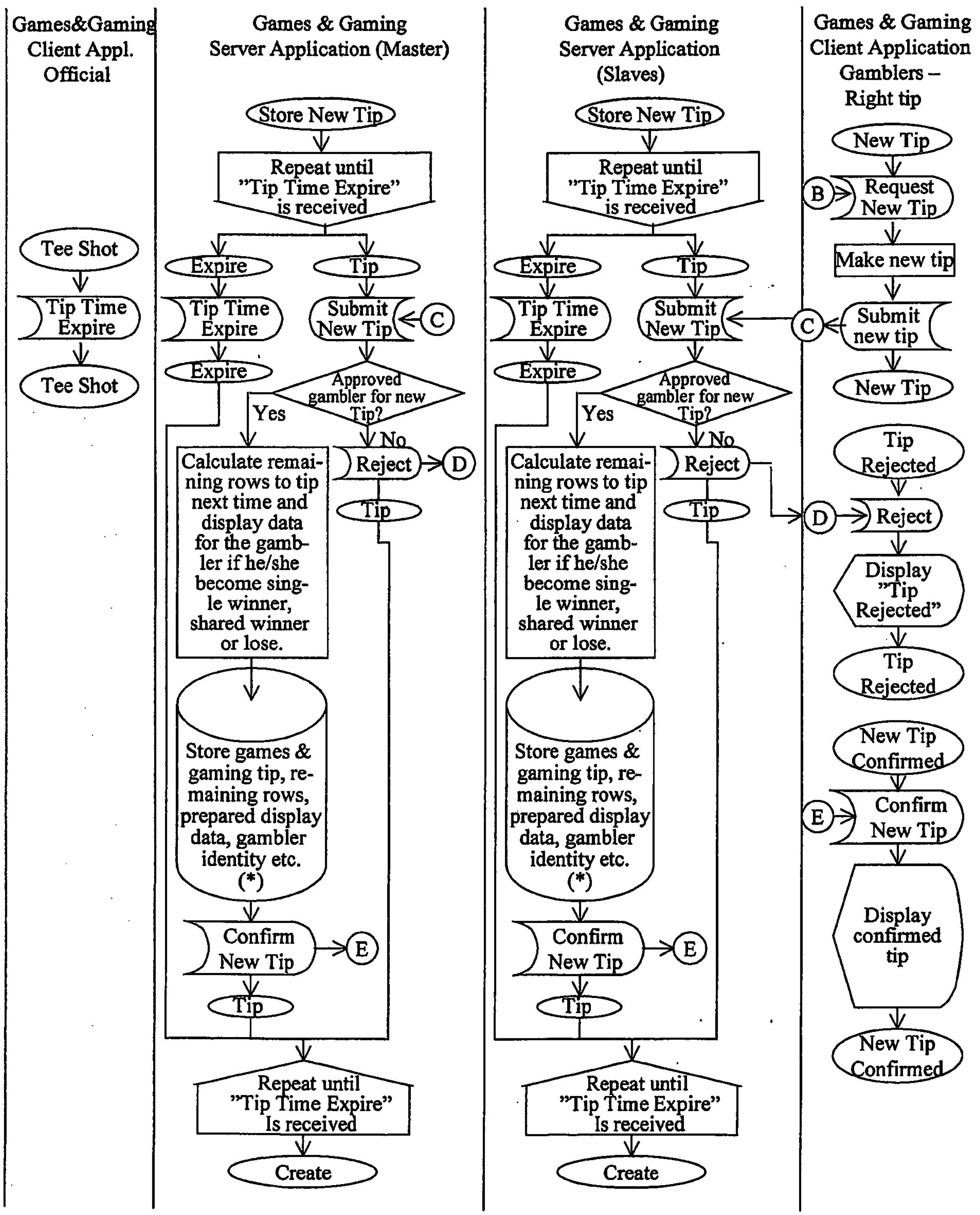

Games&Gaming Client Appl. Official
Games & Gaming Server Application (Master)
Games & Gaming Server Application (Slaves)
Games & Gaming Client Application Gamblers – Right tip
Tee Shot
Tip Time Expire
Tee Shot
Store New Tip
Repeat until "Tip Time Expire" is received
Expire
Tip
Tip Time Expire
Submit New Tip
C
Expire
Approved gambler for new Tip?
Yes
No
Reject
D
Tip
Calculate remaining rows to tip next time and display data for the gambler if he/she become single winner, shared winner or lose.
Store games & gaming tip, remaining rows, prepared display data, gambler identity etc. (*)
Confirm New Tip
E
Tip
Repeat until "Tip Time Expire" Is received
Create
New Tip
B
Request New Tip
Make new tip
Submit new tip
New Tip
Tip Rejected
Reject
Display "Tip Rejected"
Tip Rejected
New Tip Confirmed
Confirm New Tip
Display confirmed tip
New Tip Confirmed

Fig. 15

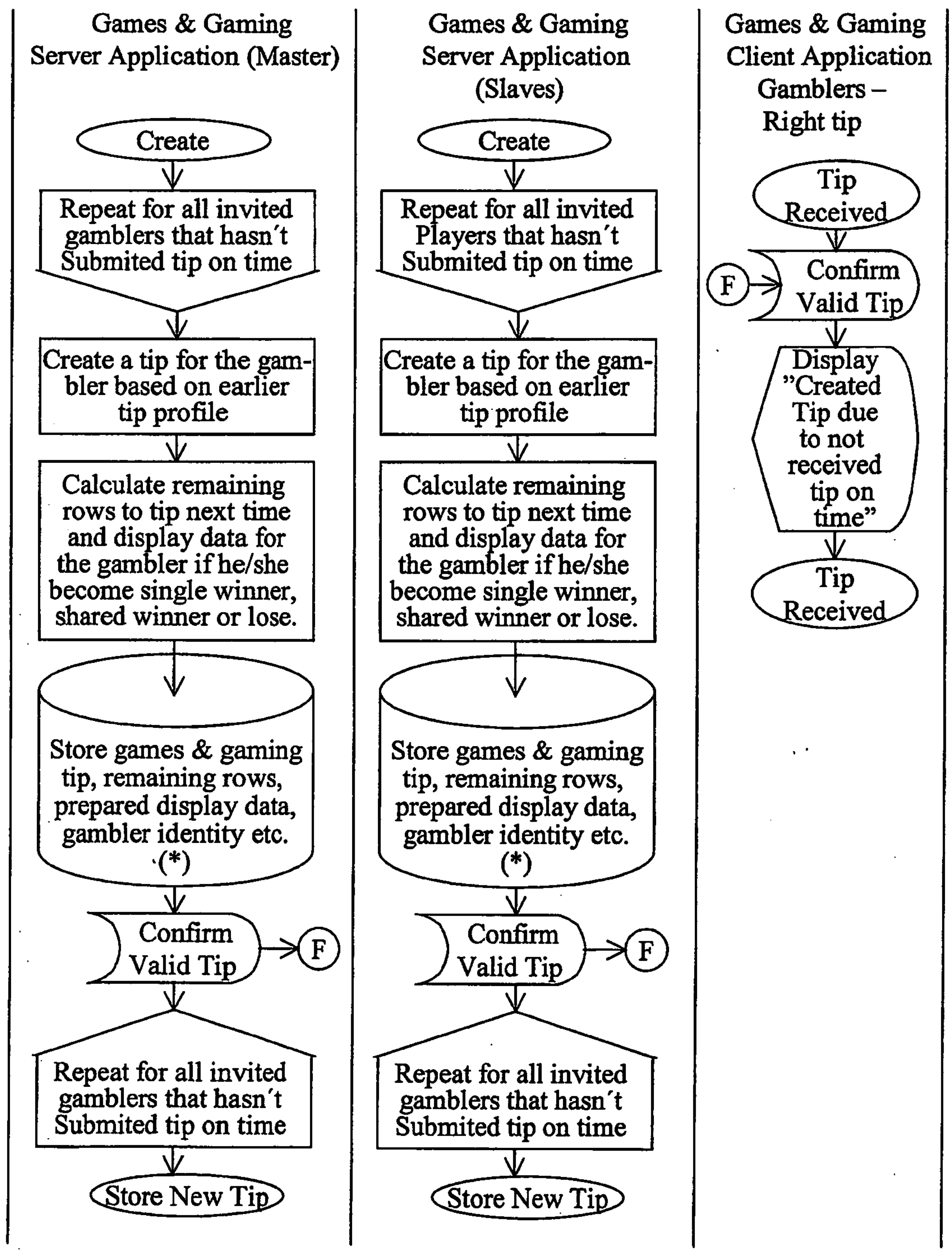

Games & Gaming Server Application (Master)
Create
Repeat for all invited gamblers that hasn't Submited tip on time
Create a tip for the gambler based on earlier tip profile
Calculate remaining rows to tip next time and display data for the gambler if he/she become single winner, shared winner or lose.
Store games & gaming tip, remaining rows, prepared display data, gambler identity etc. (*)
Confirm Valid Tip
F
Repeat for all invited gamblers that hasn't Submited tip on time
Store New Tip
Games & Gaming Server Application (Slaves)
Create
Repeat for all invited Players that hasn't Submited tip on time
Create a tip for the gambler based on earlier tip profile
Calculate remaining rows to tip next time and display data for the gambler if he/she become single winner, shared winner or lose.
Store games & gaming tip, remaining rows, prepared display data, gambler identity etc. (*)
Confirm Valid Tip
F
Repeat for all invited gamblers that hasn't Submited tip on time
Store New Tip
Games & Gaming Client Application Gamblers – Right tip
Tip Received
F
Confirm Valid Tip
Display "Created Tip due to not received tip on time"
Tip Received

Fig. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/00516

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04L 12/28, G06F 17/60, A63B 71/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, H04L, A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, EPO-INTERNAL, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1081666 A2 (NAVIGATION TECHNOLOGIES CORPORATION), 7 March 2001 (07.03.01), abstract; [0026] --	1-28
X	DATABASE WPI Week 200247 Derwent Publication Ltd., London, GB; Class P36 AN 2002-438650 & JP 2002 058772 A (ICHIREIYON KK), 26 February 2002 (2002-02-26) abstract --	1-28
A	US 6013007 A (ROOT ET AL), 11 January 2000 (11.01.00), column 2, line 55 - column 3, line 13; column 8, line 66 - column 9, line 20 --	1-28

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 May 2003	2 6 -06- 2003

Name and mailing address of the ISA/	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	KRISTOFFER OGEBJER /LR Telephone No. +46 8 782 25 00

International application No.
PCT/SE 03/00516

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9404982 A1 (CARROLL, RICHARD, W.), 3 March 1994 (03.03.94), page 31, line 7 - line 25 --	1-28
A	WO 0161671 A1 (GOREN, OFER), 23 August 2001 (23.08.01), page 11, line 13 - line 26 --	1-28
A	WO 0142809 A2 (ESPORT INCORPORATED), 14 June 2001 (14.06.01), claims 1-14, figure 11 --	1-28
A	US 5283733 A (COLLEY), 1 February 1994 (01.02.94), abstract --	1-28
A	WO 9837932 A1 (TRAKUS, INC.), 3 Sept 1998 (03.09.98), abstract --	1-28
A	WO 0209833 A1 (BALL, TIMOTHY, JAMES), 7 February 2002 (07.02.02), page 20, line 2 - page 21, line 4 --	1-28
P	WO 0244667 A2 (SCHLAIFER, ROGER, L.), 6 June 2002 (06.06.02), abstract -- --------	1-28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/00516

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
EP	1081666	A2	07/03/01	JP	2001126179	A	11/05/01
				US	6381533	B	30/04/02
US	6013007	A	11/01/00	AU	742130	B	20/12/01
				AU	3353299	A	18/10/99
				CA	2323492	A	30/09/99
				EP	1076806	A	21/02/01
				JP	2002507734	T	12/03/02
				WO	9949279	A	30/09/99
WO	9404982	A1	03/03/94	AU	5015993	A	15/03/94
WO	0161671	A1	23/08/01	AU	3837501	A	27/08/01
WO	0142809	A2	14/06/01	NONE			
US	5283733	A	01/02/94	NONE			
WO	9837932	A1	03/09/98	AU	6442798	A	18/09/98
				EP	0969903	A	12/01/00
				JP	2001513891	T	04/09/01
				US	6204813	B	20/03/01
WO	0209833	A1	07/02/02	AU	7576201	A	13/02/02
				GB	0019299	D	00/00/00
				GB	0106488	D	00/00/00
				GB	0111673	D	00/00/00
				GB	2365360	A	20/02/02
				GB	2365790	A	27/02/02
WO	0244667	A2	06/06/02	AU	3662502	A	11/06/02
				US	2002068633	A	06/06/02